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THE IRON TRADE REVIEW

VOLUME XXXIII. CLEVELAND, O. SEPTEMBER 6, 1900. CHICAGO, ILL. NUMBER 36

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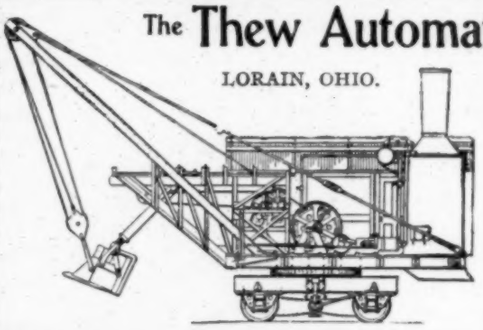

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THE IRON TRADE REVIEW

VOLUME XXXIII. CLEVELAND, O. SEPTEMBER 6, 1900. CHICAGO, ILL. NUMBER 36

THE WEEK IN IRON CIRCLES.

THE MARKET AT LARGE.

The better feeling in the iron trade continues, and the rate at which business is being done adds to the general confidence. The movement is not yet a wide one, not sufficient to cause any general improvement in prices, but it has well established the fact that the consumers have used up their stocks, and that the incubus of old contracts has been largely removed, either by completion of deliveries or by readjustments of terms. Of this latter there has been much more than sellers wanted, but the inevitable has been accepted. The past week has not developed any large business in pig iron; but with the beginning of a new month the casting up of August totals has shown the greatest month's business since November, and has given demonstration of a consuming capacity unrecognized in the quiet months preceding. The Southern furnaces, it is estimated, booked 60,000 tons for export last month, while our local exports of pig iron for the seven months ending July 31, were but 89,000 tons. As a rule pig iron sales for domestic use have been only for deliveries in the present year. The exceptions were a few, very few, contracts for round lots. Prices on Southern iron have ranged from $10 to $11 for No. 22, but it is understood that the number of furnaces willing to accept the low prices is now less than it was two weeks ago. Bessemer pig iron has sold at $15 Pittsburg, but the demand is light and only one merchant furnace in the Mahoning and Shenango valleys is now running on Bessemer iron. Bessemer billets at $17.50 Pittsburg give a very narrow spread between iron and steel, suggesting that merchant Bessemer is not much of a factor, at the present rate of consumption, in determining the price of steel. The conditions in finished material, as reflected by the order books of the mills, are distinctly encouraging. Specifications on the large contracts booked in August are now coming in, and there is also a steady inflow of new business. The result of the reduction in structural material is fairly beginning to show itself, and the week's business has been highly encouraging. Plate orders for 6,000 tons in two contracts at Chicago, and a pending contract for 3,000 tons at Pittsburg, beside ship building and bridge works requirements in the East indicate very satisfactory consumption in this line. Wrought pipe has been more active than in months and mills are so full for months ahead, that an advance in the price of merchant pipe was made the past week. Bar iron mills have accumulated considerable business in their ten weeks' shut down, and the wage conference now in session at Detroit is expected to reach a basis upon which work can be resumed, though agreement may be a matter of several days. The tin plate scale was settled by concessions on both sides, but largely to the advantage of the employes. From the present outlook there will be very general employment of finishing mills in all lines for the balance of the year. Considerably lower prices have been made on light rails in the past week, foreshadowing an important reduction in standard sectons, but as yet the basis has not been fixed. Several of the mills are pushing for business on lighter sections. Export trade in plates, bars, skelp, billets and sheet bars is excellent. American plates have been sold and delivered at Glasgow at about $32, or $7 less than the price of British mills. Producers of Bessemer iron in the valleys have been offered a round lot for export to Scotland, but high freights and the low phosphorus specification made business out of the question.

PITTSBURG.

OFFICE OF *The Iron Trade Review*,
429 PARK BUILDING, Sept. 5.

The settlement of the tin plate scale in this city last Saturday has done much to instil confidence in the iron and steel situation generally, and without a doubt the conference on the bar iron scale which began in Detroit on Tuesday will result in an adjustment of the puddlers' scale. The fact that the tin plate workers succeeded in securing a reduction of the base from $4 25 to $4.20 was a surprise to many, but the concession was made to bring about a speedy and harmonious settlement by the manufacturers. When the scale of the tin house workers is adjusted the idle mills of the American Tin Plate Co. will be placed in operation as soon as possible. The past week has seen a little better buying of pig iron and some of the furnaces on foundry iron are a trifle stiffer in their prices than they were some time ago. On the other hand Bessemer iron is almost going begging. The sales of the past week amount to about 4,000 tons. This iron was sold at $15 Pittsburg. There are no inquiries, however, for lots of any considrerable tonnage, and as the association will not make quotations for delivery after the first of the year it is the prevailing impression that there will be little buying for some time except for immediate wants. Nearly all kinds of finished products are firm, although not commanding any higher prices. Steel billets are being held nominally at $18 Pittsburg, but large lots could be had for $17.50. No new transactions have been reported, however. At New York today the traffic managers of the trunk lines east of Chicago are meeting for the purpose of considering the demands made upon them by the leading iron and steel interests for better rates for export purposes. Pittsburg interests seem to suffer more on account of present rail rates than those of any other locality, since there is no water competition. Both Chicago and Cleveland can get their products to the seaboard by the lake and the canal route, and Buffalo concerns also have the advantage of the low canal rates to the seaboard. Unless the railroads see fit to grant this reduction it is not at all improbable that the manufacturers of this district will take the matter in their own hands and will see to it that in the very near future they get their product to tidewater without being compelled to pay the rates now charged. A few days ago a representative of a large steel company in Scotland called on representatives of the Bessemer Association here and at Youngstown with a view to purchasing Bessemer iron for export purposes. On canvassing the matter it was found that the Bessemer iron made in the valleys cannot under present conditions enter into competition with the foreign product for two reasons. The first is the high rail rates to the seaboard and the other is the fact that Bessemer iron made in the valleys is too high in phosphorus for the British trade. To reduce the amount of phosphorus in the iron one-half, which would have to be done, would so increase the cost as to make competition out of the question.

PIG IRON.—The past week has seen a slight strengthening

in the price of foundry iron by a few furnaces in this district and in the valleys. On the other hand several furnaces still anxious for business are taking orders for No. 2 foundry iron at $14 per ton. Of all the merchant furnaces in the valleys Brier Hill alone is being operated at the present time on Bessemer pig. The others are either out or are turning out foundry iron. We note sales of 4,000 tons of Bessemer iron at $15 Pittsburg; also of 3,000 tons of forge iron at $13.50 Pittsburg. Small lots of No. 2 foundry are being sold continually but the foundrymen are not buying ahead very heavily. The Southern furnaces are not able to compete in this district. They are quoting all the way from $15.10 to $15.85 for No. 2, which is more than $1 higher than Northern foundry. We rivise our quotations as follows:

Bessemer, Pittsburg	$15.00
No. 1 Foundry	$14.25 to 14.75
No. 2 Foundry	14.00 to 14.50
No. 3 Foundry	13.50 to 14.00
Gray Forge, Pittsburg	13.25 to 13.50

STEEL.—There has been little buying of steel billets of late and the last sale noted was of several thousand tons at $18. It is believed that $17.50 can be done, however, on 4 x 4 billets for immediate delivery, and on a desirable order. Sheet and tin bars are still in good demand. Heavy sheet bars are selling at $21 to $21.50 and light tin bars at $23.

FERRO-MANGANESE.—The leading producer still continues to quote $85 per ton for domestic 80 per cent despite the recent reductions in steel.

RAILS AND TRACK MATERIAL.—The price of light rails has fallen off considerably during the past ten days. Rails of this description running 16 to 25 pounds are quoted at $28 and those over 25 pounds and under 50 pounds are held at $25. These low prices mean that prices on standard sections will be cut considerably when the parties to the gentlemen's agreement meet to fix the new basis. There is a good demand for light rails. The demand for track material is also better than it has been for some time. We make the following quotations: Rails, standard sections, over 200 tons, $35; 100 to 200 tons, $37; car lots, $38; less than car lots, $40; light rails, 16-pound to 25-pound, $28; 25-pound and less than 50-pound, $25, all f. o. b. mill, Pittsburg; track material —spikes, 1.75c, track bolts, square heads, 2.05c; hexagon heads, 2.15c.

SPELTER.—The market is still low and prime Western grades are quoted at 4.15c to 4.20c Pittsburg.

MUCK BARS.—The sale of muck iron still continues very limited. The small amount that is being placed on the market here is being held at $27 per ton and quotations of even $1 more have been made. Scrap muck of course is lower in price.

SKELP.—We note the sale of 1,000 tons of iron grooved skelp at 1.40c, which is a much better price than this product has commanded for some time. Sheared skelp is held at 1.55c. Steel skelp, both sheared and grooved is in little demand and is held at 1.25c to 1.30c.

BARS.—The bulk of the business in steel bars that has been taken here during the past week was at prices ranging from 1.15c to 1.25c, although as low as 1.10c is being quoted on large orders. Specifications on the contracts closed several weeks ago are now being received and several mills in this district are from four to six weeks behind on their orders. There is little demand for iron bars as long as the steel product is held considerably lower. We quote iron bars at 1.25c to 1.30c Pittsburg, and refined iron bars at 1.75c to 2c and higher, according to quality.

STRUCTURAL MATERIAL.—The result of the recent cut on structural shapes is just being felt and buyers are more numerous than they have been at any other time this summer. While no large contracts are being placed the orders are numerous. Quotations remain unchanged as follows: Beams and channels, 3 to 15 inches, 1.50c; 18 to 24 inches, 1.60c; tees, 1.55c; zees, 1.50c; angles, from 3 to 6 inches, 1.40c. Universal mill plates, 1.20c to 1.25c according to delivery and size of order.

SHEETS.—The largest producer is insisting that all purchasers take advantage of the discount of 2 per cent in ten days, and it is believed that this move will ultimately result in throwing a large amount of business in the hands of the jobbers. This is practically putting their business on a cash basis and is quite an innovation. Business is reported very good on black sheets and local jobbers have received quotations of 3c for black sheets No. 28 gauge, one pass through cold rolls and 2.90c for 27 gauge. Independent mills on the other hand are quoting as low as 2.70c for 27 gauge and 2.80c for No. 28, one pass through cold rolls. A good tonnage is being placed in galvanized sheets. Discounts ranging from 75 to 70 and 10 and 2½, with the usual 15-cent freight allowance, are reported.

PIPES AND TUBES.—On Sept. 1 the largest producer issued a new list of discounts to the trade which are based on the selling prices of raw material at the present time. The amount of tonnage received by this company last month was something phenomenal. The indication for very good business all through the fall months is very bright. We revise carload lot discounts to consumers, Pittsburg, as follows:

MERCHANT PIPE.

	Black, per cent.	Galvd. per cent.
⅛ to ⅜ inch and 21 to 12 inch	61	48
½ to 10 inch	68½	56

BOILER TUBES.

	22 Feet and under. Per cent.		Over 22 Feet. Per cent.	
	Iron.	Steel.	Iron.	Steel.
1 to 1¾ and 2¼ inches	53	55	49	50
1¾ to 2¼ inches	49	51	44	46
2½ to 13 inches	60	62	55	58

CASING.

	S. and S., per cent.
2 to 3 inches	55
3 to 4 inches	60
4½ to 12¾ inches	65

O. D. PIPE.

	Per cent.
14 to 22 inches	42
24 inches, o. d. and larger	37

THREADS AND COUPLINGS.

	Per cent.
14 to 16 inches, o. d.	35

PLATES.—Within the next few weeks a contract for 3,000 tons of tank plate for shipbuilding purposes will be placed. This is the largest inquiry in the market at the present time, although considerable business has been closed in the past week. For large orders the general quotation is 1.15c, and small lots are sold at 1.20c and 1.25c. Shell and flange steel continue in fair demand and prices are firm. We quote shell at 1.25c to 1.30c and flange at 1.30c to 1.35c. Fire-box and special grades are held at prices ranging from 2c to 3c.

MERCHANT STEEL.—A good demand is reported for all kinds of merchant steel, the buying of the agricultural implement manufacturers being very heavy. The Crucible Steel Co. also reports that there is a better demand for tool steel than for some time. We make the following quotations: Tire steel, $1.95 to $2; toe calk, $1 95 to $2.05; open-hearth basic, $2.40 to $2.50; plow slabs, $2.20 to $2.30; rolled lay steel, $2.90 to $3; hammered lay steel, $3.35 to $3.50; tool steel, $7 per 100 pounds and upwards, according to quality.

WIRE AND WIRE NAILS.—During the past week both the Rankin and Braddock plants of the American Steel & Wire Co. resumed operations, double turn, after being shut down the greater part of the summer. Jobbers report demand very good and small dealers are placing orders much more readily than they did last spring. We make the following quotations: Single carloads of wire nails to jobbers, $2.20, Pittsburg; to retailers, $2.30. Plain wire, carload lots, is quoted at $2.15 to jobbers and $2.25 to retailers; painted barb wire $2.50 in carload lots to jobbers and $2.60 to retailers; galvanized barb wire, $2.80 in carload lots to jobbers and $2.90 to retailers. Cut nails are held at $1.95, Pittsburg, in carload lots with 2 per cent off in 10 days.

OLD MATERIAL.—Little business is being done, although it is reported that dealers are buying and are taking advantage of the low prices in anticipation of an advance. We revise our quotations as follows: New Bessemer melting stock, $12 to $13, gross tons; old iron rails, $14 to $15; busheling scrap, $9 to $10; cast borings, $5.50 to $6; cast scrap, $12.50 to $13.50; steel rails, mixed lengths, $12 to $13, and short lengths, $13 to $14.

COKE.—While it has been reported that one contract for strictly Connellsville coke was taken a few days ago at $1.50 per ton, it does not appear that other concerns are making equally low quotations. In fact only a few are quoting $1.75 at present for the Connellsville product, the usual price being $2 per ton. Foundry coke is held at $2 25 to $2.50. There is little doing in either foundry or furnace coke, however. The report of the operation and production of the Connellsville region for the week ending Aug. 25 shows 20,420 ovens,

of which 13,939 are active and 6,481 are idle, the estimated production of the week having been 143,789 tons, as compared with 141,753 tons the week previous. The shipments for last week aggregated 7,405 cars, distributed as follows. To Pittsburg and river tipples, 2,810 cars; to points west of Pittsburg, 3,252 cars; to points east of Connellsville, 1,343 cars. This is a decrease of 184 cars as compared with the shipments for the week previous.

CHICAGO.

OFFICE OF *The Iron Trade Review*,
1522 MONADNOCK BLOCK, Sept. 4.

While only a few large contracts for material were placed last week, the aggregate of business closed was fully up to the average, the small-lot orders having been very frequent and helping to enlarge the total. Mills and furnaces generally report a very satisfactory business for the week, and that the number of inquiries is increasing every day. Buyers are still making purchases only for their immediate needs, as a rule, but these are large, and a good many consumers are beginning to ask for prices for long deliveries. The market generally is in much better condition than it has been for some time and is much firmer. Advances in prices have been made in some lines, and no recessions in values are noted. The tendency is toward a firmer market on some materials.

PIG IRON.—Sales in the week exceeded those of the week previous, but did not include any very large orders, the most important probably being for 400 tons. A considerable number of buyers were in the market, however, making small purchases, and the aggregate of sales was better than for some time. Some large consumers are figuring on their requirements for several months to come, and it is quite likely will place the contracts within a short time. Furnaces are firmer in their views now than they have been in the past few weeks, and while no advances in prices have been made, the very low quotations reported a week or so ago do not appear to be made with such frequency now, more sellers having reached the conclusion that they are not necessary to secure what business is going. Consumers, not finding so many furnaces willing to quote under the schedule, are gradually reaching the conclusion that present quotations are about as low as they will be, and are figuring on long-time contracts. It is expected the requirements for this market this winter will be fully up to normal, although possibly not as large as they were last year. Foundries in general are running fairly full and are using iron rapidly, necessitating frequent purchases of small lots. A sale of 9,000 tons of foundry iron for export is reported by the Republic Iron & Steel Co. Quotations are unchanged as follows:

Lake Sup. Charcoal	$19 50 @ $20 00	Southern Coke No. 4	$14 35 @ 14 85
Local Coke Fdy. No. 1	16 00 @ 16 50	Southern No. 1 Soft	16 35 @ 16 85
Local Coke Fdy. No. 2	15 00 @ 15 50	Southern No. 2 Soft	15 35 @ 15 85
Local Coke Fdy. No 3	14 50 @ 15 00	Southern Silveries	17 85 @ 18 85
Local Scotch Fdy. No.1	16 00 @ 16 50	Jackson Co. Silveries	20 30 @ 21 30
Local Scotch Fdy. No.2	15 00 @ 15 50	Ohio Strong Softeners	15 80 @ 16 80
Local Scotch Fdy. No.3	14 50 @ 15 00	Alabama Car Wheel	20 85 @ 21 85
Southern Coke No. 1	16 35 @ 16 85	Malleable Bessemer	18 00 @ 18 50
Southern Coke No. 2	15 35 @ 15 85	Coke Bessemer	19 00 @ 20 00
Southern Coke No. 3	14 85 @ 15 35		

BARS.—The business of the week was up to normal, sales in small lots making a good total, besides which there were three or four good-sized contracts closed. The market is firmer, and mills are asking more for their products than has been the case lately. Steel bars are difficult to find under 1.30c, although some sales were made under this. Iron bars are quoted at 1.30c to 1.35c. Both quotations are half extras, Chicago delivery.

STRUCTURAL MATERIAL.—There has been a better demand, and sales were larger last week than in several weeks preceding. No especially important orders were closed, but a large number of small orders were placed. The market is firm, and mills have advanced prices on plates, small angles and bars. Quotations are made as follows: Beams, 15 inches and under, 1.65c; 18 inches and over, 1.75c; angles under three inches, 1.40c to 1.45c; over six inches 1.65c; three inches to six inches, 1.55c; plates, 1.30c to 1.35c; tees, 1.70c; zees, 1.65c; small lots from store are quoted ¼c to ½c higher.

PLATES.—The largest sale of the week was one of 5,000 tons. Another important order was for 1,000 tons, and the small-lot business was fully up to the normal, so that the week's business was very satisfactory to the mills. The market is much firmer than for a long time, and prices are somewhat higher. Quotations follow: Mill shipments, Chicago delivery: Tank steel, 1.30c to 1.35c; flange, 1.40c to 1.45c; marine, 1.50c to 1.60c; fire box, 2.25c and up, according to brand.

RAILS AND TRACK SUPPLIES.—There is no change in the market. Sales of standard sections are very small, while a good business is being done in small lots of light sections. Quotations follow: Rails, standard sections, $35 to $38; light sections, $28 to $32; splice bars, 1.60c to 1.70c; spikes, 1.75c to 1.80c; track bolts, hexagon nuts, 2.25c to 2.30c; square nuts, 2.20c to 2.25c.

SHEETS.—The good demand continues, and sales last week were excellent, including several large contracts from both consumers and jobbers. The market is firm and unchanged at 70 and 10 and 5 per cent off for galvanized, with 18c freight allowance, and 3.10c to 3.20c for No. 27 black.

MERCHANT STEEL.—Orders are frequent and large, and the week's business was fully up to that of the previous week. A large number of inquiries are still unsatisfied, and mills are looking for a continuance of the demand. Prices are very firm, and some mills have advanced quotations on a few grades. Mill shipments, Chicago delivery, are quoted as follows: Smooth-finished tire steel, 1.80c to 1.90c; open-hearth spring steel, 2.25c to 2.50c; toe calk, 2.50c to 2.65c; sleigh shoe, 1.75c to 2c; cutter shoe, 2.50c to 2.65c; ordinary tool steel, 7c to 8c; specials, 13c and upwards.

MERCHANT PIPE.—Mills report a good week's business, with several good contracts closed, and further orders in sight. As a rule the business is for immediate shipment. Quotations are unchanged as follows:

MERCHANT PIPE.	Carload lots.		Less than carload lots.	
	Black Per cent.	Galv. Per cent.	Black Per cent.	Galv. Per cent.
⅛ to ¼ inch	61.2	48.7	57.4	43.4
⅜ to 8 inches	68.7	56.2	63.9	51.4
9 to 12 inches	61.2	48.7	57.4	43.4

CASING.	Carload lots.	Less than carload lots.
	S. & S.-Per cent.	S. & S.-Per cent.
2 to 2¼ inches	40.2	35.9
3 to 4½ inches	54.2	50.4
4¾ to 7¼ inches	58.2	54.9
8¼ to 12¾ inches	54.2	50.4

WIRE AND WIRE NAILS.—The demand continues large, and sales have been keeping up well, last week having seen a very large business closed for all kinds of wire products. Makers quote single car loads of wire nails at $2.48 f. o. b., Chicago, and $2.63 for less than carloads. On wire, current quotations are as follows: Plain annealed wire, $2.43; painted barb wire, $2.78; galvanized barb wire, $3.08.

OLD MATERIAL.—The market is still quiet, with small sales, none of them for large lots, but dealers are rather looking forward to a better demand shortly, and are holding prices very firmly at present quotations. Dealer's selling prices, per gross ton, are nominally as follows:

Old iron rails	$12 50 @ $13 00	Country malleable	$ 9 00 @ $10 00
Old steel rails, long	10 50 @ 11 00	Iron axles	15 00 @ 15 50
Old steel rails, mixed	9 50 @ 10 00	Cast borings	3 00 @ 3 50
Relaying rails	20 00 @ 22 00	Wrought turnings	6 00 @ 7 00
Old wheels	14 00 @ 15 00	Iron axle turnings	8 00 @ 8 50
Railroad forge	9 00 @ 10 00	Steel axle turnings	7 00 @ 8 00
Dealer's forge	7 50 @ 8 00	Mixed country steel	7 00 @ 8 00
No. 1 cut mill	7 00 @ 8 00	Stove plates	6 00 @ 6 50
Heavy cast	9 00 @ 10 00	Heavy melting steel	9 00 @ 10 00
Railway malleable	10 00 @ 11 00	Old iron splice bars	10 00 @ 11 00

CLEVELAND.

OFFICE OF *The Iron Trade Review*,
CAXTON BUILDING, Sept. 5.

Returns from all upper lake ports are not available at this writing, but those received indicate a falling off in August from the ore movement of July, and confirm the indications already pointed out, of a revision of shipping programmes. While it was determined some time ago that there would be no concessions on the price of ore originally established for 1900, it is found that some buyers are wanting modifications of their shipping arrangements. Ore that would be in furnace yards if original schedules were carried out, is still on mine stockpiles in some cases. Of course it must be taken eventually and paid for, but some of it may not come down until next year. The amount of ore on Lake Erie docks is increasing. In the past week, owing to the threatened strike at one Cleveland dock, now adjusted, and the Labor Day shut down, vessels have had some long waits.

PIG IRON.—A contract for 2,000 tons of foundry iron was let in the week by a Northern Ohio foundry, 1,500 tons going to three valley furnaces and the balance to a Southern bidder.

Prices were low considering the long time called for. The highest price realized was $14 50 at furnace for No. 2 foundry, while the cash equivalent would be considerably lower. We quote No. 2 at $14 to $14.50 at valley furnace. As a rule small lots are bought, and there is little disposition to run over into next year either by buyer or seller. One Eastern inquiry for iron for malleable work involved 8,000 tons. A number of valley furnaces were bidders and some low prices were brought out. In the main the specification was for Bessemer iron, though phosphorus up to .15 was allowed. Douglas furnace is the only resumption among valley stacks in the past week. The two furnaces at Leetonia are expected to go out in the near future but are still running. Otherwise the situation may remain unchanged for some weeks. There is no demand for forge iron from valley mills as yet. We quote $13.50 at valley furnace. Southern furnaces vary between $9.50 and $10 in their quotations on forge, making the prices delivered at valley furnace $13.85 and $14.35. We quote the Cleveland market:

Bessemer	$15 90	Valley Scotch No. 1	$15 75@16 25
No. 1 Strong Foundry	15 75@16 25	Valley Scotch No. 2	15 00@ 15 25
No. 2 Strong Foundry	15 00@15 25	Gray Forge, valley	13 50
No. 3 Foundry	14 50@15 00	Lake Superior Charcoal	17 00@ 18 00

FINISHED MATERIAL.—Structural material is in better demand by Northern Ohio works, and the effect of the reduction in price is just beginning to appear in the carrying out of plans held up for some time. Bridge and fitting and architectural iron works are all busy and have good prospects for further contracts. The plate market is still fairly active and the quotations unchanged at 1.10c to 1.20c Pittsburg for tank. Bar iron mills have a good run of orders awaiting their restarting, but the business is nothing to boast of as to price. We quote 1 20c valley mill on considerable lots and 1.25c on smaller business. Out of stock Cleveland dealers are getting 1.40c to 1.50c, half extras. Steel bars remain at 1.10c to 1.20c Pittsburg, with sellers generally refusing to quote the low prices given on the late July and early August business. Demand for wrought pipe is active and discounts on merchant pipe have been shortened 2 per cent. The difficulty of getting deliveries is a fact on which buyers comment. In sheets the improved demand keeps up. We quote common black sheets at 2.75c at mill for No. 27, with higher prices asked for special passes and better finish.

OLD MATERIAL.—Scrap for mills is finding its chief market in Pittsburg and as yet the valleys are not bidders to any extent, the steel plants excepted. Prices vary, but we give average quotations as follows: Old iron rails, at Northern Ohio point, $12.50 to 13 gross ton; old steel rails, 10.50 to $11.50 gross ton; No. 1 railroad wrought scrap, $11 to $12 net ton; machinery cast scrap, $11 to $11.50 net ton; wrought turnings, $6 to $6.50 net ton; cast borings, $4 to $5 net ton; mill scrap, $8 to $8.50 net ton; stove plate, $6.50 net ton; grate bars, $5 net ton.

CINCINNATI.

Sept. 4.

Matthew Addy & Co. say of the market of the past week: "From the way in which orders have been placed it is evident that many consumers have reached the time when they must either replenish their stocks of iron or shut down. Or they have come to the conclusion that there is no more money to be made by waiting and they, on the other hand, may actually lose by longer postponing buying. This last idea is fast taking hold on the minds of the foundrymen. They have seen the market settle and settle over a period of many months, and at last it has halted in its downward course. The iron masters in the South state that they have reached bottom. They all had a good August, with greater sales than in any month since last October. In the Birmingham district the demand for export has been and is excellent, the largest concern there having sold last month for shipment abroad 60,000 tons. It also had fair sales for domestic use. And in Birmingham the general sentiment is that the next change will be upward. Certain it is that during the last week all of the Birmingham iron masters were offered many thousand tons of orders from 25c to $1 a ton under their schedule quotations, and all this large bulk of business was uncompromisingly refused. A few weeks ago if a man made an offer on pig iron the chances were ten to one that it would be at once accepted, and the fact today that offers are declined unless at the full market is the best witness to the change in general conditions. It speaks eloquently of the firmer tone of the market. And what is true of the Southern makers is equally true of the Northern. Orders principally are for shipment over a not longer period than through the balance of the year, though there are inquiries into next year. Of course most orders are for shipment over about sixty days. There is one thing that buyers in the North are beginning slowly to realize in regard to Southern iron, and that is that it costs a good deal more to make it than previously. For example, a buyer told us the other day that two years ago he had bought No. 2 foundry Southern at $7 50 Birmingham, and he could not understand why it could not be made as cheaply now as then. He admitted that his own costs went up in 1899. And he further admitted that he could not put them back again where they were without labor difficulties of the gravest kind. The cost of Southern iron on account of the great advance in labor has been largely increased and this increase in cost is here to stay. That is, there is no way of reducing it that is possible under present conditions."

Rogers, Brown & Co. review the market as follows: "The business of the past week has been very satisfactory both in number of orders booked and the aggregate tonnage. The demand continues principally for early delivery, although some contracts have been accepted for the remainder of the year and a very limited number for the first six months of next year. Standard grades of Southern iron are principally sought, and there has not been much dealing in the central territory in charcoal iron, high silicon or special brands. These will undoubtedly have their turn somewhat later. A peculiar feature of the situation is that numerous sales of certain brands have been made at very low figures, and the furnace companies most emphatically state that they have not authorized the sales and have not received the orders. One important Southern interest has practically withdrawn from the market for the remainder of the year on foundry grades because of their oversold condition. They will not accept less than $11, Birmingham, for No. 2 foundry, and other large producers claim to be holding at from $11 to $11.50. In spite of this a few companies or their agents seem to have become panic-stricken for fear there will not be enough business to go around, and it is reliably reported have been making sales of No. 2 foundry at about $10, Birmingham basis. There is a decidedly more hopeful feeling among producers and consumers, and if the trade will only buy to cover legitimate wants and avoid speculation, there is every prospect for a healthy business during the remainder of the year."

We quote for cash f. o. b. Cincinnati: Southern coke, No. 1 foundry, $14 75 to $15.25; No. 2, $13.75 to $14 25; No. 3, $13 50 to $14; No. 4, $12.25 to $12.75; gray forge, $12 to $12 50; No. 1 soft, $14 75 to $15.25; No. 2, $13.75 to $14.25; Lake Superior coke, No. 1, $15 to $16; No. 2, $14.50 to $15; Hanging Rock charcoal, No. 1, $22 to $23; Jackson Co. silvery, No. 1, $18.25 to $18.75; standard Georgia car wheel, $21.25 to $22.25; Lake Superior charcoal, $18 to $19.

PHILADELPHIA.

Sept. 3.

The hopeful attitude of all in the iron trade continues. It is plain that buyers of pig iron who went into the market last year and laid in 12 and 18 months' supplies, when they, or at least those from whom they bought, supposed the amount contracted for would last only half that time, are at the point where further contracts must be made, and that a good many of them are at that point simultaneously. It is conceded that the political situation is a factor in the trade to the extent at least of causing cautious buying; but it is argued that if such a volume of business as is done week by week is encountered under such conditions, there is much to expect with the uncertainty ended. Temperament has much to do with the opinions current concerning the market. On the one hand are those who incline to exaggerate the extent of the improvement, because it follows so long a period of light buying; on the other hand are those who, while admitting the increase in tonnage, see nothing in the prices to warrant the optimistic views expressed in some quarters. The exports of bars, plates skelp and of low phosphorus iron are an encouraging feature, but the feeling is expressed that domestic business must yield better prices if average producers are to make a

profit worth speaking of. It is believed that a good many pig iron buyers are getting ready to place fair sized lots, the inquiry being quite active. Sellers vary in their quotations, with just enough weak ones to counteract the firmer stand taken in other quarters; for there are those who having booked enough iron to tide ver the present have advanced 25 to 50 cents from their lowest figures. Much depends upon deliveries and size of order; but generally speaking the improved demand has not improved prices or convinced buyers that they need to cover well ahead to be sure of to-day's prices. On the other hand furnaces are not disposed as a rule to sell far into next year; four months ahead is the extent with some of them. We quote $15.75 to $16.75 for No. 2X foundry; $15 to $15 50 for No. 2 plain; $14.25 to $14 75 for standard mill iron and $13 75 to $14 for ordinary; $14 80 to $15 for basic; $15.50 to $16 for Bessemer, and $24 for low phosphorus Bessemer. For 80-ft. steel billets the market is about $20 to $20 50. Mills report the volume of business in rolled material to be still quite satisfactory. Some of the large contracts on plates and bars let recently went in large part to Western mills, but Eastern works are generally quite busy. Export orders and bridge and shipyard work have contributed a considerable tonnage in recent weeks. The outlook is good for full employment of most of the mills for the next four months. We quote tank plates at 1.25c to 1 35c; refined bar iron, 1.30c to 1 35c; steel bars, 1.25c to 1.30c; angles, 1.50c to 1 60c; beams and channels under 15 inches, 1.60c to 1.65c; No. 27 sheets, 2.70c to 2.75c; No. 28 sheets, 2.80c. The old material market is still dull, with average quotations about as follows: Choice railroad scrap, $14 to $15; No. 1 yard scrap, ordinary, $12 to $13; No. 2 light scrap, $10 to $11; machinery cast, $13.50 to $14.50; heavy steel scrap, $11.50 to $12.50; old iron rails, $14 to $15; old steel rails, $13 to $14; wrought turnings, $8.50 to $9; cast borings, $6 75 to $7.25; old car wheels, $17 to $18.

BIRMINGHAM, ALA.

Sept. 3.

While there is but little if any change noted in the domestic iron market, so far as it applies to the Birmingham district, the demand for export iron shows a little more activity than for some time past. The bookings of export iron last week aggregated about 6,000 tons, deliveries to be made this and next month. Over 3,000 tons of export iron were shipped during the week. The sales made were on the basis of about $11 per ton for No. foundry. Local iron quotations are: No. 1 foundry, $12; No. 2 foundry, $11; No. 3 foundry, $10.25; No. 4 foundry, $10; No. 1 soft, $12; No. 2 soft, $11; gray forge, $10. These prices were shaded in several sales.

The local iron manufacturers have taken the question of reduced freight rates on iron shipments out of Birmingham to the executive boards of the Southern Railway and the Louisville & Nashville. Some time ago the furnacemen requested the railroad companies to grant a reduction in the rates to the north and west and to the Atlantic ports. The request was placed before the Southern iron committee which is composed of the traffic managers of the railroads coming into Birmingham. After two or three weeks' delay the Southern iron committee replied, stating that they deemed it inexpedient to lower the rates at present, whereupon the iron manufacturers placed the matter before the executive committees of the two roads named. The iron manufacturers claim that with the present prices of iron they cannot compete in the Northern markets with Northern manufacturers unless lower freight rates are given them.

The warrant yards in the Birmingham district received 7,000 tons of iron during the month of August and shipped 1,100, leaving a net gain of 5,900 tons.

The Birmingham Rail & Locomotive Co. has ordered machinery for a corrugating iron roofing plant. The company will also make siding, ceiling, etc. The plant will represent an investment of about $15,000.

The furnace at Talladega, Ala., exported 1,000 tons of iron last week.

The Kansas City, Memphis & Birmingham Railroad Co. will build a seven-mile extension in Walker County to the mines of the Empire Coal & Coke Co., now being opened up.

THE Douglass furnace at Sharon, Pa., which went out of blast several months ago was again put in blast this week.

LAKE SUPERIOR IRON MINES.

The Florence mine at Florence, Wis., started up some months ago after being closed for years, and employing this year as high as 130 men, has closed down entirely, only sufficient force being kept to run the pumps.

Corrigan, McKinney & Co., of Cleveland, have given the contract to the Drake & Stratton Co., of Pittsburg, for removing 1,000,000 cubic yards of surface at the Stevenson mine, Mesabi range, near Hibbing. It is estimated that there are 17,000,000 tons of ore in the Stevenson property. The expectation is that three shafts will be sunk ultimately. The stripping contract will require five years for its completion.

The Helen mine of the Lake Superior Mining Co., which is one arm of the great Clergue organization that has come so rapidly into prominence by its achievements at the Soo, is now producing about 1,000 tons of iron ore a day. It is located at the terminus of an 12-mile railroad which brings the ore to Michipicoten harbor. Powell & Mitchell have the contract for mining, and their first work was done about May 1. The deposit is enormous, it being estimated that there is 10,000,000 tons in sight. The ore bed is at the head of a lake closely surrounded by mountains, except that at the Helen mine there is 700 feet between their base and the lake. The deposit is a great mound of brown hematite. It is 350 feet in width and 700 feet in length. The extent of the underground ore has not been determined. Mining is quite inexpensive, gravity reducing the labor of loading and of moving the ore to a minimum. As the force of laborers is increased it is expected to make an output of 2,000 to 3,000 tons a day. The ore goes to Midland, Hamilton and Deseronto, Ont., and considerable shipments will be made to the United States, possibly some to Montreal.

The Biwabik mine has been working to a shipping program calling for 800,000 tons this year. Similarly the Mahoning has been expected to produce 1,000,000 tons, the Mountain Iron 1,250,000 tons and the Fayal 1,400,000 tons. These amounts may call for some revision in view of the change in conditions. The Norrie and the Chapin will probably send down close to 900,000 tons each.

The Oliver Iron Mining Co. has recently completed the work of changing the course of the Iron River, so as to divert it from the channel over the Dober and Isabella mines. The cost was about $60,000.

Since the Oliver Iron Mining Co. took hold of the Hartford mine at Negaunee, Mich., much has been done to put the property in shape for operation to the limit of its possibilities and by improved methods. The shaft which was down 200 feet has been sunk to 325 feet and will be put still lower. A new power plant is under erection. A new two-stage Rand compressor is now on the ground. It has a capacity for operating 20 drills, and can provide air for 25 if forced. There has been received also a new Prescott pump of latest type.

Secretary Moreland Resigns from Carnegie Steel Co.

Within the past week Andrew M. Moreland, secretary of both the Carnegie Steel Co. and the Carnegie Co., has tendered his resignation of the former position, in order that he might devote more time and attention to his duties as secretary of the Carnegie Co. The resignation, however, has not yet been acted upon. Rumors of this action were abroad early this week and gave rise to all kinds of sensational stories. One was to the effect that Mr. Moreland had been asked to sever all connection with the Carnegie interests. We are advised that such is not the case and such a move has not even been considered, neither has Mr. Moreland considered tendering his resignation as secretary of the Carnegie Co. His duties as secretary of the Carnegie Steel Co., the leading interest of the Carnegie Co., are very arduous, and in connection with the secretaryship of the Carnegie Co. impose more work upon him than should fall upon the shoulders of one man. When the Carnegie Co. was organized the Carnegie Steel Co. was also chartered and was to be a working company in the steel manufacturing business. The task of bringing into shape the reorganization system and devising the general method of book keeping devolved upon Mr. Moreland. President Schwab, of the Carnegie Co. is at the present time conferring with Mr. Carnegie at Skibo Castle, Mr. Carnegie's summer home in Scotland. It is also stated that others prominent in the company are at this conference.

THE IRON TRADE REVIEW
AND
INDUSTRIAL WORLD.

DEVOTED TO MACHINERY, METAL-WORKING AND FOUNDRY TRADES AND IRON AND STEEL MANUFACTURE.

PUBLISHED EVERY THURSDAY BY
THE IRON TRADE REVIEW CO.,
CLEVELAND, OHIO.

CLEVELAND: CAXTON BLDG., 268 HURON ST.
G. H. GARDNER, President. A. I. FINDLEY, Editor.

CHICAGO:
1502 MONADNOCK BLOCK.
B. M. GARDNER, Western Manager

PITTSBURG:
429 PARK BUILDING.
A. O. BACKERT, Manager.

PHILADELPHIA: 502 ROTHSCHILD BLDG.,
WM. D. THOMAS, Manager.

Subscription (strictly in advance), $3 per annum. Foreign Rate, $4.
Advertising Rates Furnished on Application.

The Cleveland News Co. will supply the trade with THE IRON TRADE REVIEW through the regular channels of the American News Co.

ENTERED AT THE POST OFFICE AT CLEVELAND, O., AS SECOND CLASS MATTER

SEPTEMBER 6, 1900.

YOUNG MEN AND THE TRUSTS.

It is the common thing to say of the "trusts" that they lessen a young man's chances to get on in business. Richard Croker said the other day that young men no longer have any chance in business, because of the trusts. Abram S. Hewitt, who has been found generally safe in his philosophy on business and industry, takes issue with such a statement. Large corporations, he says, do not discourage young men of character and ability, but are on the lookout for them constantly. Referring to one of his business interests he says: "I need five or six of them, young men who are willing to begin at the bottom and work up. There is no one inside to keep them back. Industry and commerce are increasing and new enterprises are being undertaken. The Government statistics of imports and exports show this. People are not dying any less today than they did in the past. Who is going to take their places? It is the competent young men, and there are comparatively few of them." Mr. Hewitt's last sentence, which is in line with the preachment of "A Letter to Garcia," is vastly significant in connection with this question. The modern haste to get rich by an easy route and a rampant spirit of speculation, for much of which the trusts and their promoters are responsible, make the ordinary route that begins at the bottom, far from attractive to the average young man seeking a business career.

If our observation of trust management has discovered anything it is that these relatively untried machines of modern business are destined to make many good places for rising young men before many years. The responsibilities of trust management and the prodigious tasks imposed upon a few men in the period of whipping into shape a huge and unwieldly conglomeration of industries, are beyond anything ever dreamed of in the regime of individual organization. Many men are carrying these burdens today as best they can, who will soon be either tempted by the possession of large fortunes or driven by the pace that kills, to give place to others. Indeed, one of the chief dangers to great industrial organizations is likely to be the frequent changes in personnel due to the pressure of administrative responsibilities, and to the inevitable factional jealousies surviving from the days of competition. These will probably be more noticeable in those consolidations which are most closely pressed by new and vigorous competition and in which errors of official judgment will prove most costly.

Young men will have opportunities under the trust regime—opportunities to earn large salaries and to assume large responsibilities. Whether the supply of the kind required will be equal to the demand is more the question, than whether the chances will come. As Mr. Hewitt observes, some of the disappointments already met with in this direction are because young men, whose fathers would like to have their sons begin where they leave off, are not at once voted into places of prominence; or as he puts it, "do not in 50 minutes get to the head of a firm which it has taken 40 years to build up."

THE EUROPEAN DEMAND FOR COAL.

The orders for American coal already received from Europe, and the immediately future export movement of our bituminous coal, is for the moment the foremost industrial topic. The publication of the statistics of our coal exports for the first seven months of the year shows 4,601,755 tons valued at $12,137,161, as compared with 3,006,082 tons valued at $7,863,289 from Jan. 1 to July 31 last year. It is estimated by those in position to know, that 5,000,000 tons of American bituminous coal could be sold in the immediate future for delivery at European ports, if there were only a way to get it across the ocean. The lack of coal-carrying vessels is the great drawback; but meantime shipments are being made and plans are under way for the building of vessels that will enter this trade to stay.

For months the reports of fuel scarcity in Germany and France, and to a less extent in the British Isles, have been discussed on both sides of the water. As is usual there was a tendency on the one hand to exaggerate the facts and to give the shortage all the aspects of a famine, while in other quarters alarmist statements were branded as the products of ignorance and sensationalism. The truth is now well known, and the British and Continental steam user has the best proof of conditions, in the rapid advance in the price of his coal. Standard Welsh coals only recently sold at $7 at Cardiff, the great coal port of Wales, while at Newcastle, Eng., $6 is a common price. The demand upon English coal centers for export to Europe has been enormous, the shortage in France last year being put at 5,000,000 tons. The general trade activity in the British Isles and Continental Europe has caused a heavy demand for steam coal, and the prosperity in all metallurgical industries has brought a consumption of coal far beyond the

ability of existing mines to supply. In Great Britain, as has been repeatedly pointed out, military service has made a heavy draft upon the labor supply, and the workmen at home were able to make so much money that they were unwilling to work full time. Colliery owners, in view of their losses in other years through strikes and business depression, were not slow to take advantage of the conditions and advance prices. The result has been very serious complaint, particularly from British iron and steel manufacturers, who, with the home demand for their products halting for the first time in five years, viewed with apprehension an additional handicap in their contest with American steel.

It is a gratifying prospect for the bituminous coal trade of the United States, which has had one year of good profits after a series of unprofitable years and an almost unbroken history of labor troubles that the foreign situation should so shape itself as to give the industry strength and stability for years to come. It is believed that under present conditions in England and Germany both of which have been shippers of coal to France for many years, the United States can sell the 10,000,000 tons of coal annually imported by France over and above her own production. As to the quality of the steam coal required in this trade, a point on which Continental steam users lay much stress, there need not be the slightest uneasiness on the part of American producers. The problem to be met is that of supplying sufficient ocean tonnage at reasonable and fairly steady rates. As with iron and steel exports, the exports of American coal must be made at low prices, the outgoing tonnage being a balance wheel to save the industry at home from disastrous competition. Only the few can expect to enter it. As Mr. F. A. Saward, editor of the *Coal Trade Journal*, of New York, observes, "while there are many points in favor of an increased American export coal business, the fact remains that it is a business requiring great capital, and it is not at all certain that any considerable number of firms will go into it, but simply those few large operators who are more or less identified with the chief coal carrying railways, assured as they are of the co-operation of the railway companies and the supply of cars and terminal facilities. Export projects in coal to be successful must be on a Napoleonic scale, and no independent shipper could afford to undertake the risk involved subject to the caprice of a railway management with which he is not in sympathy."

THE statement of iron and steel exports for July shows an increase in value over the corresponding month last year, as was to be expected. The pig iron movement, which has shown so marked a revival in the past five weeks, was scarcely under way in July, only 15,060 tons going abroad, against 20,206 tons in July, 1899. Steel rail exports were 39,849 tons against 17,426 tons; billets and blooms, 7,288 tons against 219 tons; structural steel, 5,722 tons against 3,934 tons. Steel bars held their own at 1,900 tons, but wire rods fell from 2,400 to 60, and steel plates from 4,800 tons to 1,300 tons. The value of all iron and steel exports, including machinery, was $10,658,683 in July against $8,286,560 in July last year; for the seven months the total was $76,286,248, against $57,690,624. Pig iron exports for the six months were 89,731 tons as compared with 162,868 tons in the first seven months of last year.

Personal.

J. E. Schwab, manager of the Duquesne works of the Carnegie Steel Co., sailed from New York for England on Tuesday, Sept. 4.

E. A. Noble, for 12 years secretary and treasurer of the Webster Chain Co., of West Superior, Wis., has resigned and will go into business at St. Cloud, Minn.

John W. Gates, of the American Steel & Wire Co., arrived from Europe Saturday, Sept. 1.

Willard Brown, assistant engineer of the Dominion Iron & Steel Co., Sydney, Cape Breton, who was located in Pittsburg for some time, looking after the construction of the machinery for the new plant, returned to Cape Breton this week. Of the furnaces that are being erected for this company the first will be put in blast within about four weeks and the second two months later.

The Cleveland Molders' Strike.

The tenth week of the strike of machinery molders in 14 Cleveland foundries for an advance over the wages paid in the boom of 1899 has brought no indication of the end of the struggle. That it is likely to be a matter of months is equally plain to both sides. No indication of weakening on the part of the molders appears and none is expected. There is strike benefit money in plenty, and it is being freely spent. The foundrymen are steadily increasing the number of men at work, having now 170 against 125 two weeks ago. Many of the workmen have been paid by the Molders' Union to go out, but their places have been taken by others and gains made beside. The workers are fed and housed within the foundry yards, all the foundries being closely picketed by the strikers. Thus far only one or two cases of violence have been reported.

Contrary to the prediction and expectation of the molders, the foundrymen are getting good results from their new employes. The amount of work turned out is greater per man in many cases and the quality quite satisfactory. To be again in control of their shops and to receive a fair day's work for a fair day's pay, is an experience of which the foundrymen speak with unreserved satisfaction. We have made inquiries as to the amount and character of work done under the new regime, and the replies are an interesting commentary on the restrictions with which the mistaken policy of unionism has handicapped the proprietors heretofore. In our next issue we hope to present a more detailed statement of the results already achieved.

An increased use of molding machines is one feature of the contest. In the past week a second Cleveland foundry has introduced the Tabor molding machine for work hitherto done entirely by skilled molders.

THE directors of the American Steel & Wire Co. declared the regular quarterly dividend of 1¼ per cent on the preferred stock and the same amount on the common stock at their meeting on Monday, Sept. 3. Mr. Gates resumed his place in the board at this meeting. The preferred dividend is $700,000 and the common $875,000. It is stated that the net earnings of the company for the first six months of the year were about $6,300,000. It was denied by members of the board that the company intended building a structural steel plant at Waukegan, Ill.—a report which has been extensively circulated.

No effort will be made by the American Tin Plate Co. to operate any of its plants until after the tin-house scale has been adjusted. A conference will be held in Cleveland Tuesday of next week, when it is believed a settlement will be reached.

The new battleship Alabama, from the Cramp yard, Philadelphia, was given her official trial trip last week. The speed developed more than came up to the expectations of both builders and officials of the U. S. Navy. She showed a speed of 17 knots an hour for four hours and developed 11,500 h. p. The Navy Department upon being advised of the result sent a telegram of congratulation to the builders.

THE BRITISH IRON MARKET.

There has been a somewhat steadier tone in the iron and steel trades during the past week, and the outlook is regarded as more encouraging, the revival in the shipbuilding industry, and the increased demand for material which must result, being more favorable features of the situation. The demand for pig iron is still limited for the most part to immediate requirements, but prices show no material change, while in the finished branches the business booked during the week is rather more satisfactory in volume. The engineering trades continue fairly active on the whole. American advices are more favorable, and the situation on the Continent shows little alteration, Belgian and French trade being slow, while that of Germany is also slightly quieter.

Pig Iron.—Warrants have been rather more active this week in Glasgow, but business is still comparatively limited in extent, owing to the smallness of stocks in public stores. Prices are rather above the level of last week, Scotch being at 73s. 9½d. In regard to Cleveland warrants there has been practically nothing doing during the past week, but they are quoted nominally at 72s. Prices of makers' iron in Middlesbrough have a slightly easier tendency, except in the case of No. 3, which has gone up to 71s., as against 70s. 6d. last week, being in better demand than the lower qualities, which were adversely affected by the slight increase in stocks caused by the holiday stoppage in the Cleveland district. In South Staffordshire makers have orders for moderate parcels, but there is little selling for forward deliveries. Hematite brands continue in good demand, and prices are well sustained.

Manufactured Iron and Steel.—There is some improvement to report in the finished iron and steel trades this week, rather more new business having come to hand. Prices on the whole are fairly well maintained. At the meeting of the Iron Trades Consultative Council in Birmingham, it was decided that no reduction in the price of bars should be declared in view of the high cost of production. This decision has naturally imparted some firmness to the market in South Staffordshire, and a steady trade is doing in best iron at the full rate of £11 10s, while the common iron manufacturers, who are not so favorably situated, have been refusing orders below £10 5s., and have done business at £10 10s., and even £10 15s. A reduction of 2s. 6d. in steel rails, however, is reported from Middlesbrough, making the quotation about £7 5s., and in Glasgow some perturbation has been caused by the report that American ship-plates have been bought as low as £6 15s., as against £8 2s. 6d. asked by local makers. The production of finished material has been reduced this week by the stoppage of most of the works in the Cleveland district on account of the Stockton races.—[Iron and Coal Trades Review, London, Aug. 24.

A Volume of Pig Iron Analyses.

The result of months of patient effort, involving a vast amount of correspondence, is presented in a quarto volume issued by Seymour R. Church, of San Francisco, under the title "Analyses of Pig Iron." The book is 9¼ x 12 inches, contains 173 pages, is printed on heavy coated paper, with excellent type and illustrations, and is leather bound, with seal finish. The publisher, who has long been identified with the pig iron trade on the Pacific Coast, says in his preface that several thousand letters were written to secure the analyses he presents, which are of pig irons produced in the United States, Great Britain and several other countries. The work is at once a directory of blast furnaces in the United States, England, Scotland, Wales, Canada, Mexico, Germany, Belgium, Russia and Japan, and a handbook of analysis of iron produced by the various furnace companies. In some cases the producers refused to give the information sought, but a large majority of the brands of foundry furnaces in the United States appear. There is given also valuable statistics of production in the various countries, together with analyses of standard brands in European countries where the information from individual furnaces is not available. The publisher calls attention to the fact that in a few cases the analyses as given do not seem correct, yet they have been faithfully reproduced just as furnished by the producer.

The illustrative features of the volume are interesting, consisting of views of a number of furnace plants, but particularly of half-tone cuts showing pig iron fractures. These latter are excellent and bring out clearly the size and arrangement of crystals in various grades and brands of pig iron—a very delight to the eyes of the fracture expert.

Mr. Church has done a very creditable work and one that will no doubt be appreciated at its full value by makers and melters of iron. The variations in analyses of pig iron of the same grade, but from different makers, are good illustrations of the misleading character of grade numbers, and emphasize the much-urged necessity of intelligently employing analysis in mixing iron for the cupola. The price of the work postpaid is $2.50.

Conference on the Bar Iron Scale.

The conference on the puddling and bar iron scales was resumed at Detroit on Wednesday, Sept. 5, a separate meeting of the Amalgamated Association conferees to decide on the form in which the scale should be submitted to the manufacturers having been held on Tuesday. Discretionary power having been given the employees' committee by the recent vote of the sub-lodges, it is expected agreement will now be reached, but sessions of two or three days may intervene.

The votes of the sub-lodges of the Amalgamated Association on the proposition to give the general conference committee discretionary power to fix the bar iron scale for the ensuing year, were counted Wednesday, Aug. 29. More than two-thirds of the lodges voted in favor of granting the committee discretionary power, and President Shaffer immediately notified the manufacturers of the result of the vote. Both parties then decided in favor of holding another conference at Detroit, beginning Tuesday, Sept. 4. The first votes received at the headquarters of the association did not favor granting the committee discretionary power and it was believed that the sub-lodges would reject the proposition. The majority of the votes, which were late in arriving however were overwhelmingly affirmative. In the circular sent out by the general conference committee to the sub-lodges, the objections of the manufacturers to changes in the base and foot-notes were set forth in detail. The circular closed with the following summation of the situation and was signed by the full committee:

"You will observe by the above that the manufacturers have objected to the base of the scale and to nearly all of the new foot notes. Their reasons for so doing as given your conference committee are as folows:

"1. That the scale drawn up at the Indianapolis convention is altogether too high, and not warranted by the existing state of the trade when the convention was in session.

"2. That even if in the judgment of the convention and the conference committee the scale was a fair and an equitable one at that time, the conditions of the market have altered so much for the worse, that the same scale could not possibly be a just one today and that it is an absolute impossibility to operate their mills on that scale.

"Briefly stated these are the objections our scale has met with, and along with them comes the absolute refusal of the manufacturers to sign it as it now stands, and also an implied threat that they will attempt to run their mills independent of the association unless an agreement is reached soon. The situation as it confronts us is serious. Without discretionary power we can effect no settlement. The matter is in your hands and upon you depends the result.

"Weigh these matters carefully and render your decision according to your best judgment, not forgetting to try and foresee the result of your action whatever it may be.

"The question upon which you will vote, will be whether conference committee shall have power to settle the scale to the best of its ability. The vote will be taken alone by boiling, finishing and mixed lodges."

The American Sheet Steel Co. has decided to dismantle three sheet mills at Sharon, Pa., and to remove them to Vandergrift, Pa., where the Apollo plant is located. The Haselton, O., and Youngstown mills will also be removed to Vandergrift.

Both the Braddock and Rankin, Pa., plants of the American Steel & Wire Co. were placed in full operation this week. Plenty of orders are on hand to insure the operation of the plants in full for several months.

THE TIN PLATE SCALE SETTLED.

At a conference held in Pittsburg last Friday and Saturday, between the officials of the American Tin Plate Co. and the scale committee of the Amalgamated Association of Iron, Steel and Tin Plate Workers, the much discussed tin plate scale for the ensuing year was decided upon and on Saturday night was signed by the combination. The manufacturers made an important concession to the workers in granting a reduction in the base from $4 25 to $4 20, and in view of the low prices of both iron and steel products generally the concession is considered extraordinary. The original demands of the workers were for a reduction of the base to $4.00, which would have resulted, if granted, in giving the workers several times as great an increase in wages as they have already succeeded in securing.

Many changes were also made in the footnotes, nearly all favorable to the workers. The schedule of wages for the roller, heater, doubler and shearman is the same as last year's except that they are to be computed on the new base. When the selling price of 100-lb. boxes of coke tin plates is more than $4.20 the men are to receive an advance of 2 per cent for every 10-cent advance and a proportionate decrease when the selling price is below $4.20. As the last bi-monthly examination of the sales books showed that tin plate was selling at $4.60, the men are entitled to a substantial advance, although it is hardly probable that this will be paid at any of the mills of the American Tin Plate Co., as they have all been idle since June 30, but the men employed in the independent mills will reap the benefit of the advance.

Changes in Foot Notes.

Foot note No. 1 which read, "Thirteen per cent less than above prices for iron, except shearman," referring to the prices to be paid on the various gauges per ton, has been changed by inserting "muck iron and charcoal blooms" for the word "iron."

Foot note No. 4 which read, "For all sheets sheared into circles on tin plate mills where the loss exceeds 10 per cent, 20 per cent extra shall be paid," has been completely reconstructed and now reads as follows: "All iron or steel rolled on tin or black plate mills sheared to patterns of irregular shapes or circles, shall be paid for at the rates of the square sheet."

In last year's scale foot note No. 6 read as follows: "For all sheets rolled on tin plate mills 14 square feet and over, not cut down to smaller sizes, and for tinplates worked other than tinplate style, sheet mill prices, including hand's prices, shall be paid, and when working sheets tinplate style the additional percentage of entire sheet mill cost over tinplate cost shall be added to all hands' wages on the mill; and it is understood when plate worked on a tinplate mill and is not first pickled, annealed, cold rolled and thoroughly treated as plate for tinning purposes before leaving the mill where it is worked, it shall be paid for at sheet mill prices." This has been changed by adding the words, "and that such black plate orders be marked on the bar when brought into the mill. (See Addenda.)"

No. 7 formerly read: "Where improved squaring shears are used the company shall pay for opening packs, and grinding the knives, and on jaw and crocodile shears the company to pay for opening the packs, and in mills where plates are cut into smaller sizes than 14 x 20, additional pay for shearing shall be arranged, shearman to change and set the knives." The change made in this foot note reads as follows: "Where plates are cut into 13 x 19 or smaller, or an equivalent number of inches, 12 cents per ton extra shall be paid."

Foot note No. 8 of last year's scale is not incorporated in the new scale and related to the wages of the catchers on tin plate mills. As a result of dropping this note, notes 9, 10, 11, 12 and 13 of the old scale read the same as notes 8, 9, 10, 11 and 12 respectively of the new scale.

Counting the dropped note, eight new notes were added that never have been incorporated in former scales. They are:

No. 13.—That the company furnish soft grease on Monday and on any other warming up turns. (This clause has been inserted with a view of assisting the catcher, who formerly had to spend extra time at the beginning of the week and other times when the rolls were cold, on preparations for the run.)

No. 14.—That all men working under the control of the Amalgamated Association shall not wait in the mill longer than three hours without working. (Heretofore the men waited an indefinite period for a resumption after a shut down for an accident or break down.)

No. 15.—Three turns to constitute a day's work for shearman, except in cases of accidents or other contingencies.

No. 16.—Where a shearman feeds his own packs no deduction shall be made from his wages. Where the scrap boy feeds the pack 10 cents per turn shall be deducted, except in cases where mill construction and placing of shears prevent the shearman from feeding.

No. 17.—That all tin mills working iron or steel over 32 inches wide be classed as large mills, and 10 per cent extra shall be paid for all such widths.

No. 18.—All crop ends shall be paired in equal lengths and, when possible, equal weights.

No. 19.—That standing turn and level hand men on tin mill shall receive their money directly from the company.

No. 20.—When in the judgment of the manager the work is too heavy for the catcher, the company to furnish helper.

United States Standard Gauge.

Under the caption "Limit of Output" some very important changes are made, notably the standardization of the weight of gauges Nos. 30 and 31. An unvarying standard of gauges for all weights above and below Nos. 30 and 31 has been fixed by the adoption of the United States standard of gauges and weights. This puts an end to much contention which has arisen heretofore concerning these matters.

The notes under the caption of "Output" read as follows in the new scale:

No. 1.—Where No. 28 gauge is worked in 6 or 8 sheets to the pack, 6,150 pounds shall be the limit.

No. 2.—On sizes 20½ x 56, an excess of 5 per cent, and on 26 inches wide and over, an excess of 10 per cent on the limit may be made, but if not made on that turn, the percentage cannot be made up.

No. 3.—Turns below the limit may be made up during the same week, for that week, but in making up lost weight on any turn, the output shall not exceed the limit over 500 pounds, and when the 500 pounds is made, the percentage excess cannot also be made on the same turn.

Gauge, 30; minimum, 102 pounds 2 ounces; base weight per box, 108 pounds 14 ounces; maximum, 115 pounds 11 ounces; gauge, 31, minimum, 91 pounds 14 ounces; base weight per box, 95 pounds 5 ounces; maximum, 102 pounds 1 ounce.

One and one-half per cent allowed on the 30 and 31 gauge minimum. All gauges above or below 30 and 31 shall be identical with United States standard of weights and gauges. Rates for Morewood stacks to be the same as last year.

The clause in the "Addenda" referring to the tin plate scale has also been changed and now reads as follows: "When tin plate mills are working sheets as provided in clause 6 of tin mill scale, the following percentage of wages should be added to tin mill scale: Ten per cent for No. 26 and heavier gauges and 20 per cent up to and including No. 32 gauge."

THE meeting of the Foundrymen's Association of Philadelphia on Wednesday evening, Sept. 5, was the association's 100th, and the special occasion was recognized by the serving of a lunch and by impromptu remarks. The paper of the evening, as given elsewhere, was by E. H. Mumford, of the Tabor Mfg. Co., Elizabeth, N. J., on "The Problem of Machine Molding."

THE Summit Wire Co., of Cuyahoga Falls, O., manufacturer of annealed, bright and coppered wire and of tinned and other wire specialties, has just started two additional tinning furnaces. New machinery for drawing wire has been installed, increasing the capacity of the plant by 50 per cent.

The new furnace of the Dunbar Furnace Co., Dunbar, Pa., was put into operation this week. Owing to the low prices of pig iron the company notified the men that it would be compelled to make a reduction of 5 per cent in wages, to go into effect immediately.

ECONOMY OF BLAST FURNACE GAS ENGINES.

The superior economy of gas engines as blowing engines for blast furnaces in utilization of otherwise waste gases is strikingly commented upon by M. Hubert in a paper read at the Congress in Paris who states that on the basis of the saving effected by the Cockerill Works, Seraing, Belgium, the use of the gas engine effects an economy of over $1.50 per ton of pig iron produced. This saving has been watched with considerable interest by the iron makers of both continents. It is stated that the engines already contracted for, to run by blast furnace gases, will furnish a total of 18,000 h. p., and also that a large blast engine, similar in construction to that at Seraing, has been ordered for a blast-furnace plant in this country.

At the Seraing works the gas is obtained direct from the Bessemer blast furnaces and, on its way to the engine, passes through dust collectors and receives a proportion of steam to cool it and increase its density. There is not, however, any further cleansing of the gas attempted than the usual means employed when the gas is burned under boiler furnaces. Results of carefully conducted tests of the Seraing gas engine showed a thermal efficiency of 27.16 per cent, a net efficiency of about 20 per cent, and a mechanical efficiency of 73 to 80 per cent. The consumption of gas was about 110 cubic feet per hour per brake h. p. and about 90 cubic feet per indicated h. p. Of the total amount of heat supplied, 20 per cent was converted into work, 20 per cent went out in the exhausts, and 52 per cent into the circulating water.

According to these figures this gas engine for equal power consumes rather less than one-fifth the amount of waste furnace gas that is required to be burnt under boilers in generation of steam for the ordinary blast furnace steam-blowing engines. The large surplus of waste furnace gas is utilizable in gas engines in generation of electricity for lighting and the multitudinous requirements for power in blast furnace practice. We have before this referred in our columns to the industrial development of arid regions made possible by employment of gas engine power. The advantageous employment of gas engines in blast-furnace practice has led to the building of furnaces at Toula in the neighborhood of Moscow and still larger works in the island of Elba and other localities where the extreme scarcity of water for generation of steam heretofore precluded their establishment.—[Power.

In the September *Century* Rev. Dr. D. Z. Sheffield, 30 years a missionary in China, has an article on "The Influence of the Western World on China." The burning of North China College, of which Dr. Sheffield is president, led him to start from San Francisco for China at once. One can learn much about the Boxers from a paper by R. Van Bergen on "The Revolution in China and Its Causes." A second installment of Jean Schopfer's notes on "Amusements at the Paris Exposition" treats particularly of theaters, panoramas, and other spectacles. The number is strong in illustrated feature articles and in fiction.

It is denied that the plant of the American Tin Plate Co. located at Joliet, Ill., will be removed to South Chicago.

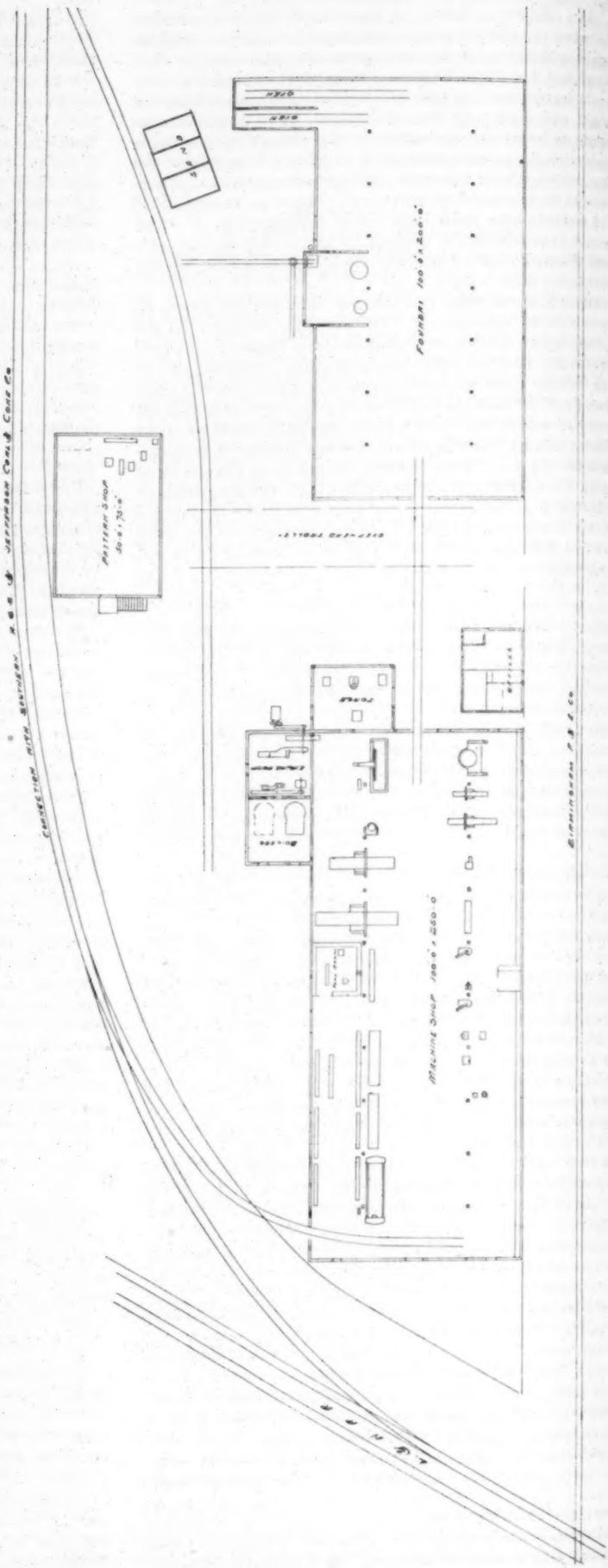


FIG. 1.—PLAN OF THE BIRMINGHAM MACHINE AND FOUNDRY CO.'S PLANT, BIRMINGHAM, ALA.

THE BIRMINGHAM MACHINE & FOUNDRY CO.

The Birmingham Machine & Foundry Co. has recently completed new buildings and installed the machinery at East Birmingham, Ala., in what is without doubt one of the most modern plants in the country. It embodies the best in shop construction and is well equipped with tools and facilities for handling any kind of engine work. Especial attention is given to crushing and grinding machinery for sugar and vacuum pans and to evaporating apparatus for the same. As illustrating the wide range of the company's operations, it is now engaged on one of the largest blowing engines ever used in the South. This will be installed at the furnaces of the Woodward Iron Co., 12 miles from Birmingham. The company has also bid recently on some of the heaviest work coming up in the South in engines and other machinery. The company is incorporated and is capitalized at $100,000, but the plant represents an investment of over $150,000. R. W. Boland is president, T. H. Aldrich, vice-president, and T. H. Benners, secretary and treasurer.

The old plant being destroyed by fire in the summer of 1899, the new buildings were laid out to make as convenient handling of material as the ground space would allow. The machine shop building is a brick and steel structure 100 feet wide by 250 feet long, of the usual type of such structures, and is provided with a crane run-way of 50 feet span. A 25-ton Pawling & Harnischfeger electric crane serves the center of this building and also the larger tools, which are so placed as to make convenient the handling of the large work. The side wings are occupied by vise benches and smaller tools, some of which are served by jib cranes on the columns.

Among the features of the machine shop is a fly wheel lathe of 30 feet capacity and a Sellers planer 96 inches by 84 inches by 30 feet long, and the usual assortment of tools for the erection of heavy work. Adjoining the machine shop building is the boiler house and engine room. The boiler is of the vertical water tube type and provision is made for a duplicate when necessary. The Corliss engine, of the company's own make, furnishes the power for the plant outside of the electrical end, which is supplied from a General Electric generator connected with a slide valve engine. Immediately in front and adjoining the machine shop is the forge shop in which is installed a 1,000-pound Bement steam hammer under which the bulk of the medium forgings are worked.

The foundry building, 100 x 200 feet and of the same style and construction as the machine shop is directly in line with the machine shop and connected therewith by a track on which the castings are moved into the machine shop. The crane run-way in the foundry is equipped with one 10-ton and one 20-ton Pawling & Harnischfeger electric crane which serves the entire center of the building. The light work and the snap work, comb making, etc., are done in the wings.

The melting facilities comprise two Colliau cupolas, one 72-inch and one 54-inch, which are capable of melting from 80 000 to 100,000 pounds. A No. 7 Root blower, driven from the main engine, furnishes the necessary blast. The foundry is further equipped with two large core ovens capable of taking heavy pieces, as the shop is especially designed to do heavy sand and loam work.

The pattern shop is a brick structure 50 x 75 feet, two stories high and equipped with a full and modern assortment of woodworking tools all on the second story, the first floor being taken up with pattern storage. It is practically fireproof, having no openings except the doors at one end. Power is supplied by an electric motor taking current from the main circuit. The entire plant is lighted by electricity all furnished from the one system.

The office building, which comprises the main business office and the engineering department, is a one-story brick structure centrally located between the machine shop and the foundry. This is a fireproof building, and is provided with a large brick vault in which are stored the business papers of the company and also the prints of all machinery as it is originated.

Spur tracks from the railroads are conveniently arranged so that raw material can be unloaded directly where needed and a track also placed in the machine shop so that cars can be loaded with the finished product under the main crane.

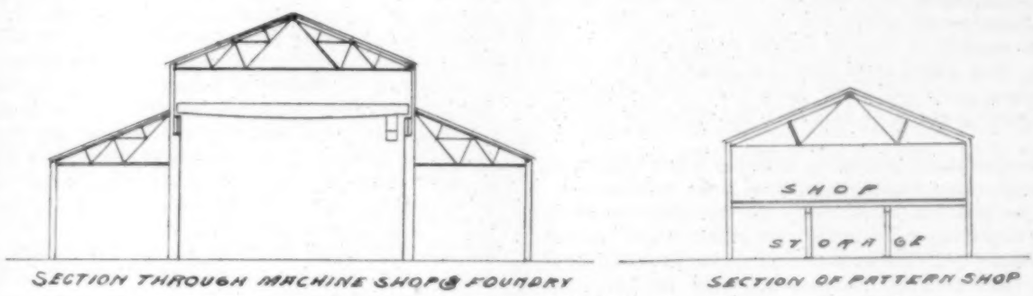


FIG. 2.—BIRMINGHAM MACHINE & FOUNDRY CO'S. PLANT.

THE H. K. Porter Locomotive Works, Pittsburg, Pa., has been granted a contract by the United States Government for a compressed air locomotive with cylinders 12 x 16 inches, and which will weigh approximately 40,000 pounds. This is by far the heaviest pneumatic locomotive ever contracted for and is to be used by the government on Iona Island in the Hudson River, above New York, in the transportation of ammunition and to insure against the possible explosion of powder and other explosives from the sparks of an ordinary locomotive. During the past few weeks the company has received a number of contracts for pneumatic locomotives for mines in South America and Europe.

THE assets of the Continental Iron Co., which is in bankruptcy court, exceed the liabilities by more than $100,000. A statement showing the value of the plants at Niles, O., and Wheatland, Pa., was filed this week and shows liabilities of $233,150 and assets amounting to $338,600. The assets are distributed as follows: Wheatland plant, realty $115,000; stock in trade, $62,841.96; Niles plant, realty $100,000; stock in trade, $45,567 97; Sharon plant, stock in trade $9,367.01; coal mine stock $317; bank accounts and outstanding bills making the remainder. The appointment of a trustee will be made on Sept. 4.

THE Pittsburg Steel Shafting Co., of Pittsburg, announces that it has opened an office in Detroit at 39-41 East Atwater St., and is prepared to quote on shafting, pulleys, hangers, belting, gas engines and steam engines.

THE Princess Furnace, represented by Howe, Johnson & Co., Philadelphia, will resume operations next week, and the selling firm is now ready for orders. The furnace is located at Glen Wilton, Va., and has a capacity of 700 tons a week.

The Kingsford Boiler Works, Oswego, N. Y., which were destroyed by fire last spring, will be rebuilt. The new plant will be located in a building of brick and iron construction.

James T. Mackay, St. Louis, Mo., dealer in machinery and machinery supplies, filed a petition in bankruptcy last week. His assets amount to $14.216.63 and liabilities $13,973 93.

The steel plant of the Cumberland Steel & Tin Plate Co., Cumberland, Md., was closed down this week for an indefinite period.

The new foundry which is being erected for the Vulcan Iron Works at Chester, Pa., is nearly completed.

THE PROBLEM OF MACHINE MOLDING.*

BY E. H. MUMFORD, ELIZABETH, N. J.

The much-discussed question, how molding machines shall be used in our foundries and the reasons why there should be any discussion of the question whatever, are made the subject of what is written below. It may be well to look at the real hard facts in the situation as the machine finds it today; try to find reasons for these facts and then to discuss the future of the molding machine from the basis of the present and the deductions it is possible to draw. There are five prominent facts:

1. Molding machines have entered upon a field of work in which they have proved their usefulness and economy, and in which they are destined to remain instruments of progress.

2. Machines dispense with some of the skill necessary to the molder by the method of their working and render more of this skill unnecessary by avoiding some of the difficulties hand molding introduces, such as mending broken corners, etc. They may, therefore, be successfully worked by unskilled laborers.

3. While laborers are perfectly well able to make machines profitable, in doing this they generally earn almost molders' wages, when paid by the piece or when putting up a large day's work, and it is therefore possible for a molder to do as well for the owner of the machine and for himself as the laborer does if he will work as hard.

4. The molder will not do as large a day's work as the laborer on a molding machine for the same amount of money, and is therefore an expense to the owner of the machine he runs, similar to what would result if molders were to charge the cupola or run the cranes.

5. There is work enough for both machine and molder, and the machine, taking as it does the repetition work, relieves him of the monotony which the general introduction of machines is accused of forcing on the wage-earning class as a whole. And owing to the speed and cheapness with which the machine turns out small parts, more of the larger and more intricate portions of machines are called for from the molder.

Another fact that is proved by statistics is that the general introduction of labor-saving machinery in the world of manufacture, while it has undoubtedly the (at least temporary) effect of displacing labor in the special field which it enters, yet increases rapidly the number employed in two other fields, namely: that where the machines are built and that which uses no machinery at all. That is, anything which facilitates the use of labor-saving machinery in general, as in the textile and agricultural industries—which the molding machine obviously does, increases the number of men employed in making these machines. As the molder, most naturally, is interested in the future of his trade, he should, therefore, do everything he can to encourage machine building in general, and nothing offers a better opportunity than leaving the molding machine absolutely untrammeled in its natural progress with unskilled labor.

Molding Machines Have Created Their Field.

To say that molding machines have found and entered upon their field of usefulness rather under than over states the fact. They have partly created the field. This will be understood to be particularly true when it is considered that everything may be treated as a molding machine which substitutes a mechanical guide or movement completely for an action of a molder, thus taking over for the special case, perhaps, this action to itself. A simple illustration of a molding machine of this sort, if it had enough parts to be called a machine, would be the time-honored match or follow board. This simple machine element usurps completely the very tedious and delicate operation of jointing the surface of the drag around the pattern. There is absolutely nothing of this operation left for the molder when the match board is lifted off, if it has been properly fitted to the pattern, and, add to the board a hinge and clamp so that it rolls over with the drag, or provide it with mechanism for its removal, as a crane, and, in the combination, you have a molding machine which simply joints the mold.

It is safe to say that, if every pattern had to be jointed in a mold by hand for all the years since match boards first came into use, relatively very few duplicate castings of machines embodying them would be in use today. The match board, the sand match, the hand rammed stripping plate, the power-rammed stripping plate, with automatic draft, the vibrator machine with patterns and match in one piece, the vibrator frame using patterns without expense for fitting to the molding machine, and thus rendering the most irregular patterns instantly applicable to molding machines, are all steps of progress in the creation and development of the machine molding field.

In other words, the molding machine is not a new thing introducing new problems and conditions to the trade. By the perfectly natural and irresistible evolution of its destiny it has finally reached a point of independence where it does not need the expense of the skilled craftsman.

Simultaneously with it, has come the greatly extended use of duplicate castings, the demand for which the molding machine has helped to create, so that it comes not as a beggar but as a useful and well known member of society.

Will Molders Develop the Best Possibilities of Machines?

The officers of the Iron Molders' Union have recently taken the stand that, to quote their own words, members of the union should be allowed "to develop the best possibilities" of the molding machine, thus also to "control" the machine. Undoubtedly these men are perfectly sincere in their belief that these things can be done and some attempts to prove this have been made. Now the "best possibilities of the machine" are of course those in the path of economy in its use and the demonstrations of the molder's power in this direction have not been such as should encourage him to persevere.

Some machines of the most efficient modern type were undertaken by Union molders in a line of work where it was, by chance, perfectly easy for the writer to make exact comparison with exactly similar machines on exactly the same work in another shop. Result: 65 flasks from the molder for $2.75, and 160 flasks from the laborer for $2.40—i.e., what was costing more than 4c in one shop was costing only 1½c in the competing shop, and I have wondered ever since if the Union seriously meant this as an initial step toward the "control" of the molding machine, as it certainly could not be considered their "best possibilities." No, the control of the molding machine will never pass from the hands of the evolutionary destiny of the manufacturing world to either the molder, the builder of the molding machine or its owner. And the figures quoted above show that machines may be made to pay without molders.

Why the molder will not work harder, so as to make the molding machine as successful in his hands as in the laborer's, is not a hard question to answer. Very little use for his hard learned trade is called for. If the molder would succeed as a machine operator, he must forswear his handicraft and strengthen his back, and there is, as he wisely reflects, no real reason why he should—therefore he doesn't. Why should he? But why does the Molders' Union seek to control the machine? It has been implied by one of its officers that it is because it is becoming a power which threatens the power of the organization. This is true of some shops absolutely, of some partially, and in some, as the machine is known today, it never will be true, and nothing except the development of the machine and its accessories can change the situation.

In the first instance, the entire work of the foundry is or will be molded by machines; in the second, the machines mold or will mold a portion of the work, and in the third, the work is of such a sort that no existing machine can profitably handle it. In the first named foundry, no molders will be found of the kind we are discussing. In the second, molders will be found making such pieces as the machines would pay on, and making more of those very pieces because the machines have cheapened the smaller castings, making it easier to get what probably represents the more troublesome and expensive parts of some line of manufacture, and to get them so promptly that more of the large pieces are sure to be needed on account of improved deliveries of the finished outfit. There is thus, apparently, every reason why the molding machine, with its unskilled labor, and the molder, should form

*Prepared for the meetings of Foundrymen's Associations, Wednesday evening, Sept. 5, 1900.

a very happy working family in such a shop, and why they do not is hard to see except there is being forced there some ulterior object foreign to the interests of the molders in that shop and foreign to the interests of the shop owner.

Why the Union Would Control Machines.

The only possible reason why, in a shop employing both molders and molding machines operated by unskilled labor, the Molders' Union should object to such operation of the machines seems to be this: In case of a difference of opinion between the union and the owners of the foundry as to how (the owner would say) the shop should be run or (the Molders' Union would say) the men should be treated, which involved a strike, the foundry would not be absolutely closed, inasmuch as the machines would not be stopped, and heats would be taken off every day. If this is the reason why the Molders' Union is seeking to "control" the molding machine, then what has been written above has no interest for the molder, there need be no pretense of an attempt to "develop the best possibilities of the machine" nor argument of the present nor thought of the future. Everything is plain and above board, as soon as this is admitted, and "control" of the traveling crane, or the water supply, or the highway leading to the foundry, would do as well.

I will not think that any one interested in the future of the iron or brass molders' trade will do anything to impede the progress of the molding machine. I do not think even that any employer will be deterred from introducing improved machinery such as molding machines in his foundry by any consideration except the economy he may realize from its use with unskilled I labor, and know that the introduction of the molding machine in our foundries is as certain to be successful as that of the turret lathes (to which the molding machine has often been likened) and the other automatic machines all through the machine shop.

I would close by saying that, as a builder of molding machines, I know the situation to be as I have pictured it above, and what I have written is not mere theory of a machine-molding millenium, but the sober judgment of experience. Let me further say that, in mingling with molders who have worked for me and dealing with their union committees, I have found them individually men of such good sense and spirit that I have built upon these qualities among the molders the expectation that the present rather absurd obstruction of the molding machine operated by men not molders, but men for all that, will speedily die out.

A CINCINNATI correspondent says of the relation between the iron market changes and the prices of machinery: "The vacillating conditions in the iron market have little interest for the machine tool makers as a rule just now, because all those larger concerns that are running are still working on high-priced material purchased to supply the phenomenal trade of early spring. It is generally felt among the machine tool manufacturers that the buying public believes that because pig iron is down castings should be, and therefore prices of machines. An official of one of the larger concerns makes the point that castings are not so low as a year ago, and that molding is higher. Thus, material and labor being more costly, will naturally affect prices for some time to come."

THE wrought pipe and boiler tube works completed at Etna, Pa., some time ago by Spang, Chalfant & Co. has the distinction of being the only pipe mill that is operated entirely by electricity. No two machines in the mills are run by the same motor. In all 23 motors are required to keep the mill in operation. The capacity of the plant will be 80 tons of tubing a day, consuming 100 tons of steel daily. The main building is 440 x 100 feet, the warehouse 75 x 140 feet.

AT the annual meeting of the stockholders of the Beaver Dam Malleable Iron Co., of Beaver Dam, Wis., held Tuesday, Aug. 21, S. W. Lamoreux, C. Starkweather, and C. Hofmeister were reëlected directors for the full term of three years. M. A. Jacobs was elected director to fill the vacancy of E. A. Schiller. The following officers were elected for the ensuing year: President, Geo. B. Congdon; vice-president, S. W. Lamoreux; secretary, E S. Mason; treasurer, D. P. Lamoreux; superintendent, J. E. Fisher.

MACHINE FOR CASTING STEEL CHAINS.

A patent has been taken out in England recently, according to an exchange, for a casting apparatus for cables such as are used on board ship as anchor cables, mooring cables and the like; and it has mainly for its object to provide an apparatus by which such cables can be made by casting links of steel one into another. According to the method of manufacturing chain from links and cables the links are made of circular form and subsequently pressed or forged to the desired elliptical shape, with the usual stud or strut fitted in them, and after this they may be annealed or treated to any of the well-known processes to which steel is subjected. The chain or cable is made up of links in which a cast link is cast within another link—say at the end of a piece of completed cable—or within that link and another separately made link. In the latter case, when the cast link is formed, two links are added on to the cable. A link-casting apparatus, when ready to receive the molten metal for the formation of a link, comprises a body or base having covers on the upper side and secured thereto by hinges at their outer ends. A gap extends literally through the base or body and in which the existing link or links rest during the operation of casting fresh links and a space equivalent to the gap is provided between the two inner ends of the covers and through which a part of the existing link or links extend, the molds fitting or resting partly in the body and partly in the cover in chamber or recesses formed by the two. A runner is provided in one of the covers for conveying the molten metal to the mold or lining material which is made up of four semi-cylindrical pieces, two of which when placed end to end form the upper half of the mold, while the other two similarly placed together form the other half of it. To place the sand molds or lining-segments in the metal box, the covers are thrown up off the base, and the links to and through which a new link is to be cast, being placed in position in the gap, the mold segments are placed properly in position in the chambers or recesses. Then the covers are moved down over the molds, and the whole apparatus is then ready to receive a charge of molten steel. In this condition the mold will thus bridge or span the gap and lie within the links, to which the new link is to be added.

The two new furnaces which the Illinois Steel Co. is erecting at its South Chicago works will be known as No. 9 and No. 10, and will be 95 feet high, 22 feet in diameter at the bosh, 14 feet in diameter at the hearth, 15 feet 6 inches in diameter at the stock line, and 12 feet in diameter at the bell. They will be equipped with 11 7-inch tuyeres. Each furnace will have four 4-pass hot blast stoves, 25 feet in diameter by 100 feet high to the top of the dome, and each stove will have a heating surface of 56,000 square feet. The furnaces will have five engines, of the horizontal cross-compound type, with steam cylinders 44 and 84 inches by 66-inch stroke and with blowing cylinders 84 inches in diameter. They are now being built by the Mesta Machine Co., of Pittsburg. The condensers for the engines are of the Weiss type. Twenty-four Wheeler vertical boilers, each rated nominally at 390 horse power, will be used. The company expects to have the first furnace ready for blast early in the coming spring. The other furnace will not be completed until about the middle of 1901. The daily capacity of each furnace will be 400 tons.

It is announced that the plant of the Danville Bessemer Co., of Danville, Pa., has been purchased by the Lake Superior Iron & Steel Co., of Sault Ste. Marie, Ont. The rail-rolling mill will be dismantled and the machinery shipped to the Canada works. The purchase does not include the plate mill.

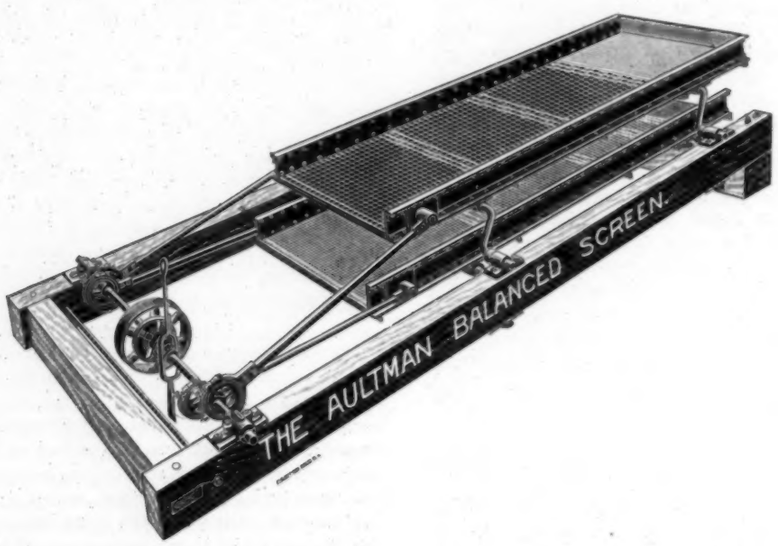
THE new pipe mill of the Harrisburg Pipe & Pipe Bending Co. at Harrisburg, Pa., is in full operation and has sufficient orders on the books to insure the operation of the mills for some time.

THE Stirling Co., of Barberton, O., is constructing the boilers for the new battleship Maine which is to replace its staunch predecessor, which went to the bottom in Havana Harbor. The boilers are of the Nicklausse pattern and will have a capacity of 20 000 h. p. The company has contracts to furnish boilers for government boats aggregating 70,000 h. p.

THE AULTMAN BALANCED SHAKING SCREEN.

A shaking screen has recently been perfected by the Aultman Co., of Canton, O., which by reason of its construction does not require any foundation framework or bracing other than is needed to support the weight of the screen and resist the pull of the driving belt. The destructive shake or vibration common to ordinary screens is entirely prevented by a novel and ingenious arrangement of the moving parts. The forward and backward movement of the upper screen is perfectly counterbalanced by the reverse movement of the lower screen, and all of the thrust of the moving parts is completely absorbed in the heavy countershaft. No shake or vibration whatever is communicated to the structure upon which the screen is placed.

The screen frames are so placed on rocker arms that the screening surface always moves through a true arc. At each end of the stroke the material naturally raises slightly and is again forcibly caught by another portion of the screening surface. Great capacity and the most thorough separation is secured on any material whatever that is subject to the srceening process. All bearings that require oiling are so far removed from the material that no oil or grease could possibly come in contact with the screened material. Any material, wet or dry, that is subject to the process of screening can be rapidly and perfectly separated. Favorable materials, such as sand, shale, fire clay, phosphate, cement, and coal, when dry, are thoroughly screened at the rate of 15 or 20 tons per hour, and when damp at the rate of 10 to 15 tons per hour.



The dimensions are as follows: Length of upper and lower screens, 14 feet; width, 3 feet; height over all, 26 inches; size of friction pulley, 24 x 6 inches; speed of countershaft, 250 r. p. m. Space required for screen complete on skids, 18 feet by 4 feet 6 inches. The frame carrying the wire cloth or perforated metal is in removable panels for convenience in renewing the wire cloth, and to provide for changes in the fineness of separation.

It is believed that in this new type the Aultman Co. has removed all of the objectionable features in shaking screens and has also greatly increased their capacity. The company is prepared to build this screen for the general trade, with either two or four separations and to guarantee satisfactory operation. Tests will be made on any material furnished and results submitted for consideration and comparison.

The Lloyd-Booth Co., of Youngstown, O., was awarded the contract last week for the erection of the new 14-inch continuous mill at the Ohio plant of the National Steel Co., Youngstown, O. The contract calls for the completion of the mill by Jan. 1, 1901. The plans and specifications for the mill were drawn by the Morgan Engineering Co., of Worcester, Mass.

The blast furnace at Embreeville, Tenn., was blown out last week.

THE COMPOSITION OF RAIL STEEL.

An interesting contribution to the literature relating to the strength and composition of steel rails was made by W. R. Webster, of Philadelphia, in one of the discussions at the recent engineering and metallurgical congress in Paris. The matter under consideration was the report on international standards of tests, a special section of the congress taking up the various sub-divisons of the association work carried on in the past few years. Mr. Webster is thus reported:

"I would like to call attention to the report of the English committee appointed by the Board of Trade to inquire into 'The Loss of Strength in Steel Rails Through Use,' as their work has been in the same lines as that of the American committee referred to by Mr. Colby. The following is quoted from Appendix VII. of the English report: 'It is probable that the Board of Trade will expect or desire the committee to recommend an analysis for the guidance of engineers and manufacturers, which shall, in the judgment and experience of the committee be the composition of the steel to insure a good and safe wearing rail. I therefore suggest, after careful consideration from the points of view of the manufacturer and user, that, exclusive of the iron, a steel rail should have the following range of composition:

	Min.	Max.
Carbon	.35 to	.5
Silicon	.05 to	.1
Sulphur	.04 to	.08
Phosphorus	.0 to	.08
Manganese	.75 to	1.00

"'Mr. Edward P. Martin, of Dowlais, considered the suggested figures with me and approves them.

(Signed) 'E. WINDSOR RICHARDS.'

"Thirty-five to fifty carbon was recommended by the American committee of the International Association for Testing Materials for rails of from 50 lbs. to 75 lbs per yard. The full requirements are given below:

Carbon	.35 to .50
Silicon	Not over .20
Sulphur	
Phosphorus	Not over .10
Manganese	.70 to 1 05

"These recommendations are remarkably close, especially when one stops to consider that the work was done in different countries by these committees entirely independent of each other, and that in America only acid Bessemer steel is used for rails; while in England both the acid and basic Bessemer steel are used. The results compared above indicate that the suggestions which I have made in my paper as to each country preparing standard or representative specifications for each class of material can be easily carried out. It is not too much to expect that at the General Congress of the International Association for Testing Materials to be held in 1901 each country will present representative specifications, and that the international specifications will be agreed upon. I take this occasion to state that Sir William Roberts-Austen, president of the Iron and Steel Institute, and the secretary,

Mr. Brough, are very anxious that the congress should be held in connection with the Iron and Steel Institute, 1901. I know of no institution better fitted to assist us in this work than the Iron and Steel Institute, and trust that our next congress will be held with them.

"The English committee have been working at a great disadvantage, as in all cases of the broken rails examined they knew nothing whatever of the previous heat treatment of these rails in rolling, and this has such a great influence on the final structure of the rail that had it been known it would have accounted for many of the abnormal results referred to in the report. It is to be hoped that the work of the committee of the Board of Trade will be continued and that rails will be rolled under known conditions, and that rails from the same heat of steel will be finished hot, medium and cold, in order get at the true value of the mechanical work of rolling at different temperatures. This will give much valuable information in one of the most important lines of research that has been too much neglected up to the present time.

"In this connection I would suggest that a record be kept of the amount of shrinkage of the rails from the finishing temperature in rolling to the normal temperature. This would give an accurate check on the finishing temperature of rolling and after sufficient data has been collected these results could be introduced to great advantage in our specifications by merely stating that the shrinkage shall not be more than — per cent. Of course manufacturers would object at first, but they would soon see that the good and simple check on the finishing temperature is something that is most required in order to produce satisfactory rails, even from the very best of steel chemically."

The Loss of Strength in Steel Rails.

Mr. Webster refers above to a British Board of Trade committee which investigated the causes for the loss of strength of steel rails under use. After four years of investigation the committee reported recently. We will not attempt to present any analysis of the vast amount of correspondence given in the report, or the voluminous reports of experiments and tests; but the following comment upon it given in the *Ironmonger* will indicate the lines followed:

"The serious accident to the Scotch express at St. Neots on Dec. 24, 1895, due to the compound fracture of two rails, was one of the causes leading to the appointment by the Board of Trade of a committee 'to inquire to what extent of loss of strength in steel rails is produced by their prolonged use on railways under varying conditions, and what steps can be taken to prevent the risk of accidents arising through such loss of strength.' The committee were appointed in May, 1896, but their report has only been issued this week. It is signed by all the members—Lord Blythswood (chairman), Sir Benjamin Baker, Sir Isaac Lowthian Bell, Prof. W. R. Dunstan, Pro. A. B. W Kennedy, Major F. A. Marindin, Mr. E. P. Martin, Mr. E Windsor Richards, Sir. W. C. Roberts-Austen, Prof. T. E. Thorpe and Prof. W. Cawthorne Unwin. The report, with its 12 appendices, covers 124 pages, and includes several plates of microphotographs, autograhpic records of tests, etc. It must, however, be regarded as a summary of experiments and information, rather than as a series of recommendations for future practice.

"The interest aroused by the whole question of the durability of steel rails has been considerable in this country, but it has not led to so much discussion as on the Continent or in America. Many of the European States own a large proportion of the lines, and have made the durability of rails a public question. In the United States, on the other hand, there is a rage for the standardization of all things, which has led to the adoption, by the several technical societies, of standard section and the persistent upholders of high carbon steel for harder rails have made themselves heard to some effect.

"The danger of a broken rail is small. Until the St. Neots accident, no serious accident due to this cause had occurred, though the annual breakage of rails may be taken as 600. Sir Lowthian Bell estimates the number of rails in use in the United Kingdom at no fewer than 15 000,000, and there is only one fracture per 25,000 rails registered as having occurred while in use. In view of these figures, it can hardly be said, as Sir Lowthian does, that legislation is called for. Our rail manufacturers and railway engineers have proved sufficiently trustworthy to enable us to travel unconcernedly under present conditions; but the information collected in the present report will be a useful guide in aiding them to increase still further the standard of safety.

"The battle lies between the hard and the soft rail; that is, between steels containing under or over about one-half per cent of carbon. Soft steels do not wear so well—they lose more by attrition and flow of the metal. Hard steel, on the other hand, seems to be more brittle when tested under the impact test by a falling weight. Strength and ductility are important features, but they are not convertible terms, and there is no criterion or figure of merit by which the opposing factors can be expressed. A happy mean for the chemical composition, approved by Messrs. Windsor Richards and Martin, shows carbon 0.35 to 0.5, silicon 0.05 to 0.1, sulphur 0.04 to 0.08, phosphorus .0 to 0.08, and manganese 0 75 to 1 0. Phosphorus exists in steel in more than one form, only one of which is very harmful, so that, broadly speaking, the brittleness does not depend entirely on the percentage present.

"Inquiries addressed to the leading railway companies show that there is a preponderance of fractures near the joints, but this may be remedied by sufficiently strong rails with ample webs and good joints kept in order. The hammering action of the wheels on the tread of the rails hardens the top surface, and this is probably the cause of the increased liability to fracture when the rails are turned upside down, either for testing or for further use; but as long as the rails are kept in the same position, the minute flaws engendered do not appear to be of great importance. Apart from this surface-hardening, rails like chains are liable to what is vaguely termed 'fatigue,' and are improved by annealing; and it may be remarked that recent experience in America seems to show that rerolling has also a beneficial effect. Standard methods of testing, properly related to the size and composition of the rails as regards mechanical tests, and standard chemical tests are wanted. Microphotography of polished and etched sections shows the mineralogically composite structure of steel, and will prove a valuable aid in determining whether the metal has been subjected to proper treatment, thermally and otherwise. The concordance of the results with all mechanical tests except the impact test is remarkable, and the method also affords evidence as to the liability to corrosion which is a potent factor in reducing the strength of rails, though as a rule it is a secondary consideration compared with the wear."

THE Autumn meeting of the Iron and Steel Institute will be held at Paris, on Sept. 18, 19, 20 and 21. The president will deliver an address, and the following papers have been promised for reading: "The Development of the Iron and Steel Industries in France since 1889." By H. Pinget, secretary of the Comité des Forges de France. "Iron and Steel at the Paris Exhibition." By Prof. H. Bauerman (Ordnance College, Woolwich). "American Methods of Testing Iron and Steel." By Albert Ladd Colby, South Bethlehem, Pa. "The Washing of Iron Ore." By Alfonso Dory, Bilbao. "Rolling Mills." By Louis Katona, Resicza, Hungary. "The Constitution of Slags." By Baron H. von Jüptner, Donawitz, Austria. "A New Method of Producing High Temperatures." By E. F. S. Lange, Manchester, Eng. "The Action of Aluminum on the Carbon of Cast Iron." By Godfrey Melland and H. W. Waldron, Mason University College, Birmingham. "A Microchemical Research on Iron and Phosphorus." By J. E. Stead. Groups will be formed and the members of the institute will visit the mining, engineering and machinery sections of the Exposition.

THE railroads in the Pittsburg district will spend a large amount of money within the next year in erecting bridges. The Pittsburg, Virginia & Charleston road will build two steel bridges, one at Baldwin, four miles from Pittsburg, and the other at Hays station, near West Homestead. The present double track bridges at these points were built some years ago, but owing to the fact that the P. V. & C. is to be made a four-track line as far as Port Perry, new structures must be erected. The Wheeling & Lake Erie road will also spend a large amount in erecting bridges. This company will erect a 100-ft. through plate girder bridge; two 45-ft. deck plate bridges, and three 154-ft. through Pratt trusses on its main line.

THE EVOLUTION OF THE STEAM SHOVEL.

Among recent literature on the development of the steam-shovel industry is a statement from the Vulcan Iron Works Co., of Toledo, O., contrasting early efforts in this direction with the latest products of modern steam shovel plants. In size and efficiency perhaps a more marked advance has been made in the shovels recently built for Lake Superior iron mining than in those designed for any other form of service, and some extracts from the review will therefore be of interest to many connected with the iron trade:

Twenty years ago a steam shovel was practically unknown to the general public. They were being built but in a crude manner, and were not a success practically and were only used by some of the largest railroad companies and contractors. There was not enough demand to cause the builders to make a close study of each proposition and build a steam shovel accordingly. Those that were built were of a very light pattern, and a large amount of wood was used in their construction. They were subject to continual breakdowns and delays for repairs. To give an idea of how steam shovels were built during their early history we give herewith a partial specification of a steam shovel built about 20 years ago, also one which is built today and being used generally, both by contractors and railroad companies:

Specifications of an Early Steam Shovel.

The shovel was a crude affair, all the machinery being placed on an ordinary railroad flat car. The crane was made of wood and built low to pass under bridges. The jack arms consisted of wooden timbers fastened under the front end of the flat car, extending across same to prevent upsetting. The hoisting and swinging machinery consisted of one pair of 8-inch by 12-inch engines, fitted with links for reversing, and geared to two drums, one for hoisting, the other for swinging. The shovel was propelled by an endless chain leading from drum shaft to chain wheels on the front truck under the car. An upright boiler, 48 inches diameter and 7 feet high, was placed at the rear end of the car, not in the center but over to one side, while the double engines were set over on the opposite side. The water tank was hung under the car, being made of iron. The house over the machinery was built entirely of wood. The dipper was 1½ cubic yards capacity, fitted with wooden dipper stick or handle. The machine weighed complete, car and all, about 38 tons. The shovel had a capacity to handle 750 cubic yards per day in ordinary material.

This machine sold for $7 000 cash, and was one of the first steam shovels built in the United States to run on standard railroad trucks, and was only preceded by a low-frame wide-gauge steam shovel, which never proved a success. The Terre Haute & Indianapolis Railway owns one of these standard gauge railroad steam shovels, sold to it by the Vulcan Iron Works Co. something like 20 years ago. Of course this shovel has been repaired a good many times, and within the last few years has been completely overhauled, being placed on a new steel car and a good many modern improvements added to it. We understand it is doing fairly good work at the present time.

Below is a specification of a thoroughly modern steam shovel in general use today, also designed and built by the Vulcan Iron Works Co.: The shovel is mounted on a car constructed entirely of steel, which is 35 feet long, 10 feet wide, with 15-inch steel sills. It is equipped with special Fox pressed steel patent car trucks, with 33-inch wheels. It has a 2½-cu. yd. dipper, a 15-inch steel dipper stick or handle 16 ft. long, with steel racking fitted to same. It employs 1¼ inch hoisting chains, 120 feet long, and 1⅛ inch swinging chains, 31 feet long. The crane is 23 feet high from track and 21 feet out from mast; has a 14-ft. clear lift with the dipper door open. The shovel will dump 25 feet from the mast either way. It has large steel sheaves, 18 to 24 inches diameter; compound propelling rig, with 14-inch steel clutch and 27-inch steel chain wheels; heavy drop-forged propelling chain; locomotive boiler 66 inches diameter by 14 feet 6 inches long, 135 pounds steam pressure; 125 h. p. hoisting engines, 8 x 10-inch cylinders, double; 40 h. p. swinging engines; 35 h. p. crane engines; 60 x 6-inch hoisting gear, with a 10 x 6-inch brass pinion; 16 x 32-inch hoisting drum; 48 x 4-inch swinging gear, with a 7 x 4-inch brass pinion; 9 x 30-inch swinging drum; 42 x 4-inch crane engine gears, with 6 x 4-inch brass pinions; 5¾-inch steel shipper shaft with pinions cast solid to same, fitted with adjustable brass boxes; steel jack arms with 16 ft. spread, 5½-inch steel screws; 1,200 gallon water tank hung under the car. The shovel complete weighs about 90 tons and has a capacity to handle 3,500 cubic yards of almost any kind of material in a day of 10 hours. One of these steam shovels has handled 5,000 gross tons of iron ore from the solid bank in a day of 10 hours. It has a record of handling 3,000 cubic yards of blasted rock in a day of ten hours.

The demand for steam shovels is steadily on the increase and the time is near at hand when even larger steam shovels than this will be built to meet the ever increasing requirements. Only a few years ago it was a difficult matter to get a contractor or railroad company to think of purchasing a steam shovel weighing over 40 or 50 tons. They wanted the capacity but did not want so much weight. This of course was an impossibility, for to build a steam shovel that had the desired capacity and at the same time durability the different parts that go to make up the construction must be made large and as simple as possible in order to overcome breakage. In fact the failure of steam shovels in their early history was owing almost entirely to their light construction. Finally a steam shovel was built which weighed about 93 tons and was put in operation in the Mesabi iron ore country digging iron ore from the solid bank, and during the month of June, 1897, handled 170,000 gross tons of iron ore. After this steam shovel had been in operation for a short time and the contractors and others heard of its workings, then everybody wanted a large steam shovel and the demand for them has been steadily on the increase ever since.

Uses of Steam Shovels.

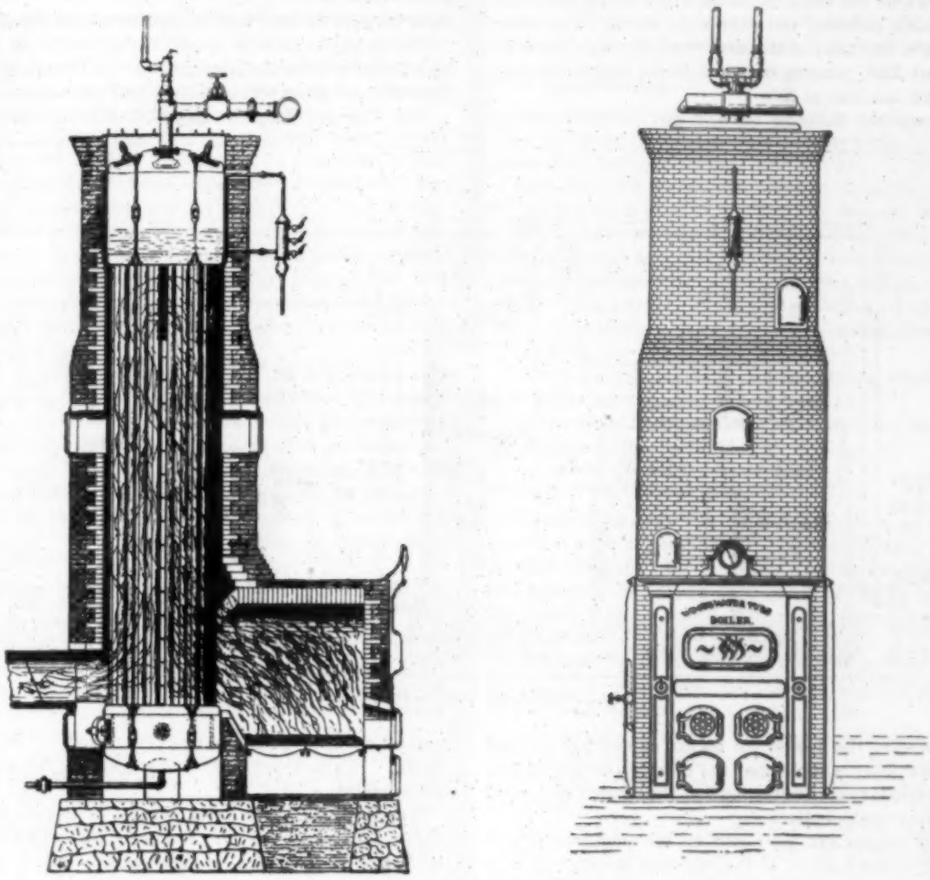
Steam shovels are used in a large variety of work to-day, and it will not be amiss to give a few of the more important uses to which they are put: Handling clay in brick yards, for making brick; Railroad excavation, such as cutting down embankments, trestle filling, widening cuts, cutting down heavy grades, excavating and loading gravel on to cars for ballasting; digging iron ore direct from the bank; handling it from the stock pile on to cars, also on to boats. For mining phosphate in the Southern States, principally South Carolina and Florida, where economy is more necessary than at any other place we know of, for the price of phosphate rock after it has been mined, washed, dried, ground and hauled to the chemical works and treated chemically ready for the market, instead of being $20 or $30 per ton as it was a few years ago is now only $3 to $4 per ton. The excavating of the top soil from off the phosphate rock is very severe on a steam shovel, as the earth is soft, wet and sticky. Not only this but the phosphate rock lies from 10 to 20 feet underneath this top soil and the excavation is principally through heavy timber lands, where roots and stumps of all sizes are encountered every time the dipper is put into the soil. Another very important matter is the fact that very little good water is accessible for use in the boilers and salt water is used almost entirely. The steam shovel is also used for digging canals, reservoirs, trenches for large water mains and large sewers. It is also used for dry gold placer mining, in Montana, Idaho, Wyoming and California, in old river beds where the gold bearing gravel must be elevated to a height of 30 feet or more and dumped into the sluice box in order to be washed. It has proved to be successful especially in places where scarcely sufficient water is obtainable for use in the sluice box.

Spang, Chalfant & Co., Pittsburg, Pa., are now making plans for the erection of a new tube mill, to be the exact duplicate of the mill recently completed and placed in operation. It will be 430 feet long and 100 feet wide, but will be equipped for making tubes up to 24 inches in size and over 8 inches, while the mill recently completed makes tubes only up to 8 inches. As in the other mill, the rolls will be operated separately by electric motors. This innovation has already proved highly successful.

Extensive improvements are being made at the plant of the Sylvan Steel Works at Moline, Ill. Two waste-heat boilers of 250 h. p. and two heating furnaces will be installed. An 18-inch mill is being substituted for the 16-inch mill.

WOOD VERTICAL WATER-TUBE BOILER.

The John Wood Mfg. Co., of Conshohocken, Pa., manufactures the vertical water-tube boiler shown below. It is manufactured in about the same manner as the horizontal boiler of the same company, except that the longitudinal drum is discarded and the upper tube cylinder is elongated for sufficient steam and water room. A series of tiling is also placed diametrically across the center row of tubes to within about three feet of the top tube head. The gases from the furnace either for firing or waste heat furnaces pass up the first half of the tubes and then across the tiles at the top, descending on the opposite half of the tubes to a flue provided at the bottom. By this means the gases are consumed to the best advantage. As the heat first strikes the nearest half of the tubes the steam and water ascend to the upper drum and there separate. The water descends to the lower drum to ascend again, producing a good circulation, maintaining equal temperature of the water and steam and preventing the formation of scale. The latter is generally found in a powdered form in the lower drum away from the action of heat, and is blown out or removed through the lower manhole.



WOOD VERTICAL WATER-TUBE BOILER.

The top head is provided with sufficient number of manholes to give access to all the tubes and the admission of a man. The bottom drum is provided with a manhole on the side to give access to that part. The brick casing is provided with a sufficient number of cleaning doors for the blowing off of the tubes by means of a steam hose, but this is seldom required as the boiler is virtually a self-cleaner both inside and outside. These boilers can be placed in batteries up as high as 250 h. p. units and connected to a horizontal flue with a damper between each and thence to a main stack, or they can each have a separate stack and can be operated jointly or separately, as occasion may require. It is claimed that this type of boilers is well fitted for blast furnace steam plant or for any place where waste gases can be utilized as well as for any firing steam plant. The cost of maintenance, it is claimed, is very small and the management simple. A large amount of power can be set in a small place compared with the old type. The inventor and builders of both the horizontal and vertical type of these boilers state that the demand has been so great that six large works in this country and several in Europe are busy building them.

RECEIVED FROM THE TRADE.

Seymour R. Church, 307 Sansome St., San Francisco, in a striking pamphlet printed in colors, refers to the tiles, fire brick, pig iron, crucibles and cement which are the specialties of his trade. The pig irons sold to Pacific Coast foundries are those handled by Rogers, Brown & Co., S. R. Church being their agent in that section.

We have received the illustrated catalogue of steel plate exhaust fans, blowers and dry kilns issued by Wm. Bayley & Sons Co., of Milwaukee, Wis., general founders and machinists. The catalogue contains description of the company's steam fans, pulley fans, ventilating wheels, exhausters, blast gates blowers, etc., together with description and illustrations of steam engines, horizontal and upright, automatic and throttling, made by the company.

The 16th edition of the Cochrane heater catalogue of the Harrison Safety Boiler Works, of Philadelphia, has come from the press and is a good example of the use of brains in the preparation of trade literature. Effective putting of the salient features of this company's products has been studied, and the value of good type, clear illustration and strong arrangement of matter seems to have been appreciated by the editor of the publication. In the earlier pages is a discussion of the value of a feed-water heater, and a comparison is made between open heaters and closed or pressure heaters, the advantages of the Cochrane open heater being gone into in detail. Illustrations in section, outline and half-tone show the construction of heaters of various capacities for varying service, also of special heaters and receivers for exhaust heating or drying systems. The pamphlet contains 60 pages and is 6 x 7½ inches.

In a pocket-size catalogue of 42 pages the Robert Aitchison Perforated Metal Co., of Chicago, illustrate typical perforations in sheet metals. The company's business was established 32 years ago and meantime it has accumulated an assortment of sizes covering a wide range of requirements. It maintains its own machine shop for the construction of dies and other appliances required in the business. Its list of sizes covers over 600 in iron, steel, brass, tin, lead, zinc, copper, aluminum. A surprisingly long list is given of industries making use of perforated metals.

THE IDEAL SYSTEM OF WATER PURIFICATION.

As illustrating the rapid growth of the Ideal system of water purification since it was first introduced to the public at Moorehead Bros. & Co.'s plant at Pittsburg in January, 1898, it is stated that almost 100,000 h p. are now in daily use, furnishing over 8,000,000 gallons of pure water for manufacturing purposes. The system is used in the purification of hot water, and its advantage is in its ability to produce pure water from which 95 per cent of the scale-making properties have been removed, at a cost of 60 per cent less than if the water were cold. Other important features are the small amount of floor space which the plant occupies and the little attention it requires, once in 24 hours being sufficient.

The operation of the system is as follows: The hot wate. from the heater V, shown in the illustration, is pumped into the precipitating and settling tank V_2 which is so constructed as to cause a complete intermixing of the material used for treating the water from the solution tanks A A with pumps C C_1. The precipitated deposits passi nto a settling chamber in the bottom where the water remains undisturbed and from which this residue is blown out once in 24 hours. The water then passes into the filter tanks and down through the filter beds of ground flint, passing outward to the boilers through valves G, K and into line at X.

The filter requires flushing once a day. This is accomplished by reversing the flow of the water, so that the purified water from one filter will cleanse the other of its impurities. This requires about two minutes, and at the same time water is being supplied to the boilers.

The solution pumps are governed by the volume of water being supplied to the boilers, so that the flow of solution from each tank is proportioned to the amount of feed water used, and neither an excess nor an insufficient quantity is supplied to the precipitating tank. Test cocks Q_1, Q_2, Q_3 are also provided for the engineer to keep check on the quality of the water being supplied, so that it is not necessary for him to guess at the results being produced.

The attached analyses of the feed water before and after passing through this system furnish illustrations of the work accomplished.

Analysis of Water from Genesee River at Rochester Street Railway Co.'s Power House, Rochester, N. Y.

Raw Water.	Grs. per Gal.	Purified Water.	Grs. per Gal.
Ca'cium carbonate	2.215	Lime	.21
Calcium sulphate	8.621		
Magnesium carbonate	3.999	Magnesium	.09
Iron and alumina oxide	.391		
Sodium chloride	8.272		
Total solids	22.418	Total	.30

Reduction of scale-forming ingredients, 95.60 per cent.

(Signed.) DICKMAN & MCKENZIE, Chemists.

Analysis of Water at the Purington-Kimball Brick Co.'s Plant, Blue Island, Ill.

Raw Water.	Grs. per Gal.	Purified Water.
Lime carbonate	4.05	.40
Magnesium carbonate	4.95	.75
Lime sulphate	4.30	
Magnesium sulphate	Trace.	
Sodium chloride	1.17	
Silica	1.83	
Iron oxide	.07	
Volatile and organic matter	6.13	
	22.80	1.15

(Signed.) DICKMAN & MCKENZIE, Chemists.

Reduction of scale forming ingredients, 95.15 per cent.

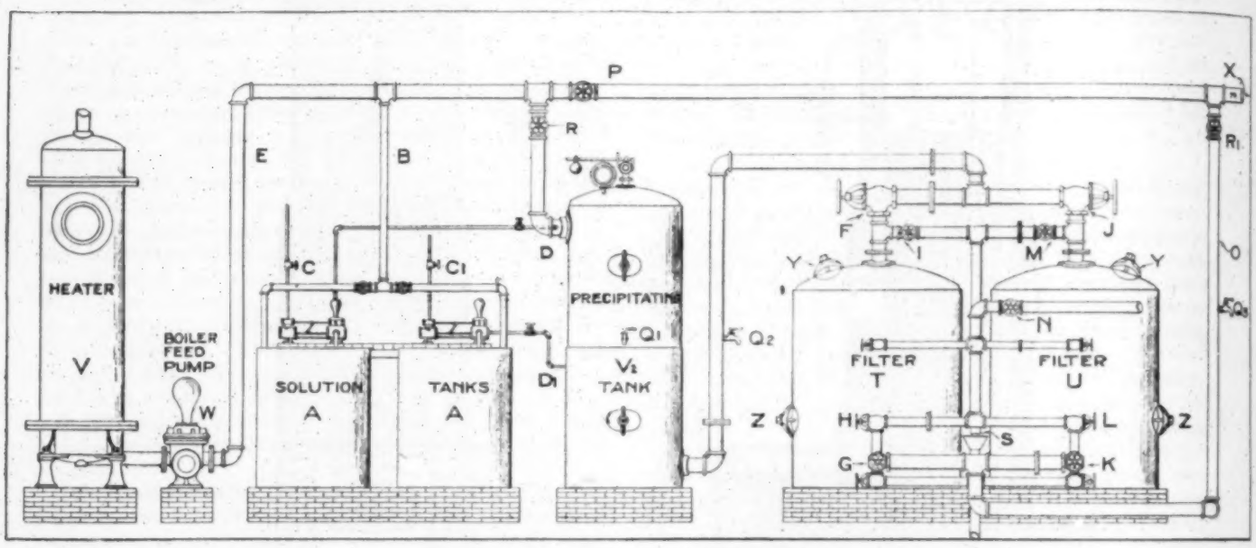
Analysis of Water at American Steel & Wire Co.'s Plant, Joliet, Ill.

Raw Water.	Grs. per Gal.	After purification	Grs. per Gal.
Sodium chloride	4.46	Lime	.28
Sodium sulphate	5.87	Magnesia	.19
Calcium sulphate	13.90		
Calcium carbonate	1.58		
Magnesium carbonate	7.93		
Iron oxide and alumina	.02		
Total solids	33.76		.94

Reduction of scale forming ingredients, 92.70 per cent.

(Signed.) GEO. H. ELLIS, Chemist.

This apparatus is built by the Pittsburg Filter Mfg. Co., Carnegie Bldg., Pittsburg, Pa.



IDEAL SYSTEM OF WATER PURIFICATION.

INDUSTRIAL SUMMARY.

[If you are in need of machinery of any description, please notify *The Iron Trade Review*, and we will put you in communication with our advertisers at once.]

New Buyers in the Market, and Some of Their Wants:—

The Republic Iron & Steel Co. is receiving bids on a 26-inch billet mill for its Youngstown, O., Bessemer Steel plant. The mill complete will involve about 500 tons of castings.

The Taylor-Hemphill Mfg. Co., of Baltimore, Md., with a capital stock of $100,000, was chartered at Dover, Del., last week. The new company will engage in the manufacture of sheet metal.

The Kentucky Fire Brick Works, Firebrick, Ky., are in the market for a Porter or Baldwin second-hand locomotive, weighing 7 to 9 tons, 36-inch gauge. Must be in first-class condition.

The city of Holyoke, Mass., will open bids Sept. 10 for 1,000 tons of cast iron water pipe.

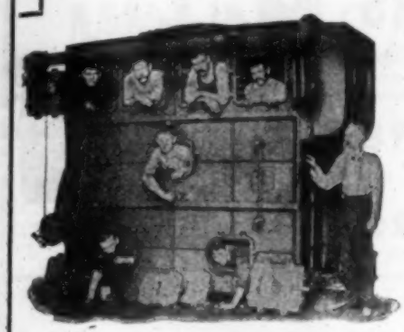
Rose Hill, Va., is figuring with Brown Bros., 59 Wall St., New York, on a blast furnace project, according to newspaper report.

The Pittsburg District:—

Owing to the large amount of business taken by the National Tube Co. last month, every department in the McKeesport, Pa., works will be in full operation within the next 10 days. There is every indication that the plant will be operated without stoppage until next summer at least.

The plant of the Pittsburg Steel Hoop Co., Glassport, Pa., is being operated night and day and orders enough have been booked to insure the operation of the plant until the first of the year. This plant has only been operated a few months and has been a success from the start.

The buildings of the American Axe & Tool Co., Glassport, Pa., are rapidly being put under roof. It is the intention of the officials of the company to have the work completed



COCHRANE
FEED-WATER HEATERS.

The major portion of all scale forming matter that gives trouble in boilers is the carbonates of lime and magnesia. Now to precipitate or to render these insoluble it is necessary to drive off the carbonic acid gas by the application of heat. To drive off these gases a vessel open to the atmosphere is required, or there must be a free steam space into which the gases may go.

The conditions are ideal in an open heater such as the

"COCHRANE"

for the release of these gases, and there is provision within these appliances for detaining these precipitates, and for easily and quickly removing the accumulation.

A closed heater is solid with water—no chance for the gases to free themselves from the water until they reach the boiler, then there's where the precipitation occurs! Moreover, even if the deposit did take place in the closed heater, it would be at the expense of its heating efficiency, and closed heaters are mighty hard to clean.

HARRISON SAFETY BOILER WORKS,
Clearfield and Seventeenth Streets, - PHILADELPHIA, PA.

within a few weeks in order that the installation of the machinery can be proceeded with. According to the present outlook the plant will be in operation by the first of the year.

Eight of the 14 open-hearth steel furnaces of the Carnegie Steel Co. at Duquesne are nearing completion.

The Russell Machine Co., of Pittsburg, will erect a steel building at 28th St. and A. V. Railway, 75 x 120 feet, within the next few months. A 15-ton crane will be installed. The business of the Russell company has greatly increased of late. The new building will be used for repairing second-hand machinery, tools and boilers before placing them on the market.

The capital stock of the Sharon Steel Co., Sharon, Pa., will probably be increased to $5,500,000. A special meeting of the stockholders has been called for Oct. 11, when the proposition will be laid before them.

More than $1,000,000 will be spent in the erection of new bridges in Pittsburg within the next few months. The Pennsylvania Railroad Co. will replace the old Fort Wayne bridge across the Allegheny river with a modern steel structure the cost of which is estimated at more than $600,000. The city authorities also have plans already drawn up for replacing the South 10th St. bridge over the Monongahela River with a modern structure. The cost of this bridge is estimated at about $500,000.

The Holland Co., with offices in the Hamilton Bldg., Pittsburg, and plant at Wheatland, Pa., reports business very good. The company takes steel rails run down or battered at the ends and repairs them so that they can again be used. The ends are cut off and new holes are bored for the joint straps, and the rails, a trifle sort, can be relaid. The expense of doing the work is small compared with the saving.

The Washington Improvement Co., which owns 20 claims in the Cascade range of mountains in the State of Washington, was organized in Pittsburg this week. The principal stockholders are well-known men in the iron and steel industry in the Pittsburg district. The president is Chester B. Albree; secretary, H. L. W. Hyde, and the treasurer, Reed F. Blair. Capital stock, $100,000.

The first annual meeting of the stockholders of the Pittsburg Stove & Range Co. was held at Pittsburg, Monday, Sept. 3. The directors declared the fourth stock dividend last Saturday, making 7 per cent on preferred stock for the first year. The directors elected the following officers: Charles H. Bradley, president; John D. Nicholson, vice-president; John S. Graham, secretary and treasurer; Alexander M. Neeper, L. W. DeHaven and James F. MacKee.

New Construction:—

The Birmingham Rail & Locomotive Co., Birmingham, Ala., will shortly build a plant for the manufacture of corrugated iron roofing, siding, ceiling, etc. It is the intention to have the plant in operation within three months.

The Racine Iron & Steel Mfg. Co., Racine, Wis., will erect a building 70 x 200 feet at Lakeside, Wis. This will form the main building for the plant which is to be located there. The company was recently incorporated for $50,000.

The Philadelphia Engineering Works, Philadelphia, Pa., will erect a new machine shop. The dimensions will be 105 x 200 feet.

The Calumet & Hecla Co., of Houghton, Mich., will erect a new boiler shop 60 x 100 feet.

Ground was broken last week for the building of the new Cambridge rolling mill plant, Cambridge, O.

Chicago District and Northwest:—

The Tuthill Spring Co., of Chicago, announces the completion of the north building of its plant at Clinton and Sebor Sts. recently destroyed by fire. The plant is well equipped for the manufacture of vehicle springs, all of the latest labor-saving machinery being used. Prompt shipment of orders is promised.

President Taylor of the Chicago Iron & Steel Foundry Co., Chicago, Ill., has stated that his company will probably locate at Lakeside instead of at Kenosha, Wis.

The Menzel Foundry Co., Minneapolis, was formally dissolved last week, and the plant was purchased by Chas. G. Menzel and J. A. Jeffery. The new firm name will be Menzel & Jeffery.

The foundation for the steel works of the Dominion Iron & Steel Co. at Sydney, Cape Breton, N. S., has been laid and the blooming mill is nearing completion. The Riter-Conley Mfg. Co., of Pittsburg, has sublet the contract for the blooming mill to McIntosh, Hemphill & Co., of Pittsburg, and the contract for the blowing engines to the E. P. Allis Co., and the Wilson-Snyder Co., of Pittsburg, will build the pumps.

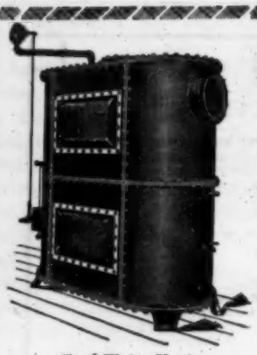
Samuel M. Shartle and G. Bevis have purchased the plant of the La Tourette Machine Co., Middletown, O. The price paid was $17,000.

The Wright

Safety Water Column.
Steam Separator.
Exhaust Pipe Head.
Steam Trap.

These goods are unchanged in either the internal mechanism or external appearance, and all patent litigation is ended by the change of names.

THE WRIGHT MFG. CO.
Write for discounts.
RIGHT { In principle. In price.
70-80 Mason st. CLEVELAND, O.



Feed-Water Heater.

FEED WATER HEATERS

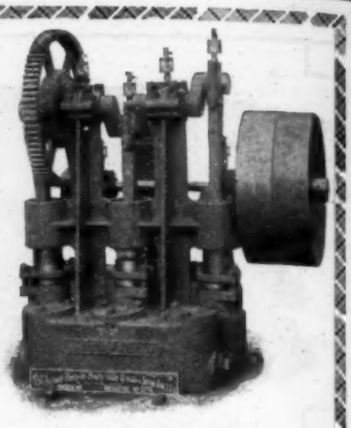
Cut herewith illustrates Stillwell's latest design. **Made entirely of cast Iron.** Saves fuel and filters the feed water for steam boilers. Use only exhaust steam.

BOILER FEED PUMPS

SINGLE, DUPLEX AND TRIPLEX.

AIR COMPRESSORS

JET-CONDENSERS-SURFACE



Triplex Boiler Feed Pump.

IF INTERESTED ADDRESS

The Stillwell-Bierce & Smith-Vaile Co., 227 Lehman Street, DAYTON, OHIO, U. S. A.

General Industrial Notes:—

The Cambria Steel Co, of Johnstown, Pa, issued orders last week to shut down all its coke ovens at Dunbar, Pa. The plant there contains about 400 ovens.

The plant of the Coss Co., of Mansfield, O., manufacturer of carriage hardware, will shortly be removed to Flint, Mich. Citizens of Flint have subscribed $17 000 worth of the stock of the company in addition to site, and $50,000 for buildings will be furnished.

Receivers were last week appointed for the Snowden & Cowmon Mfg. Co.'s plant, Baltimore, Md. The directors of the company have authorized the statement that it is embarrassed only temporarily and that contracts will be undertaken. The company was organized in July, 1894, when the business conducted under the name of Snowden & Cowmon was purchased. The company manufactures all kinds of steam engines, hoists, rivetors and other machinery.

The buildings recently vacated by the Union Malleable Iron Co., of Moline, Ill., have been purchased by C. H. Deere for the consideration of $25.000. It has not been definitely decided what is to be the nature of the new industry that will be installed in the plant.

The Inland Steel Co., Marquette Bldg., Chicago, has acquired the business of the Indestructible Post Co.,of Brazil, Ind., and will manufacture and introduce steel posts with burnt clay foundations. These posts are for fences, railway signs, signals, etc. H E Speyer, who was formerly with the original company, is now manager of the indestructible post department of the Inland Steel Co. The company has issued a catalogue devoted to steel posts, which are represented to be as cheap as wood.

The Detroit Steel & Spring Co., Detroit, Mich., states that the fire at its works on Aug 19 was confined to the foundry department, in which are made steel castings for railway and other work. It is expected to have this department in operation very shortly. The loss was fully covered by insurance and will be replaced as quickly as possible. The rolling mills, springs shops, etc., were not affected, being in separate buildings.

The Cleveland Punch & Shear Works Co. recently made shipment of its tools as follows: 8 ft. radial drill to Center Star Mining Co., Rossland, B. C.; 50-inch rotary planer to Milliken Bros., Brooklyn, N. Y.; 10-ft. power bending rolls to Southern Railway Co., Atlanta, Ga; 30-inch throat punch to H. W. Markey & Co., Seattle, Wash.; 19-inch throat punch to American Clay Working Machinery Co, Bucyrus, O; and a No. 3 bar shear to American Axe & Tool Co., Beaver Falls, Pa.

Blast furnace No. 3 of the Cambria Steel Co., Johnstown, Pa., has been completed and has been put into successful operation.

The Bellaire, O., plant of the National Steel Co. continues to run full, with plenty of orders ahead. The company is still shipping a large amount of its product to Europe.

The Jeffrey Mfg. Co., of Columbus, O., was awarded a gold medal at the Paris Exposition covering its line of elevating, conveying and mining machinery. Its exhibit attracted not a little attention from Exposition visitors

The plant of the Glasgow Iron Co., Pottstown, Pa., was put into operation in nearly all its departments this week. The Potts Brothers' rolling mill also resumed operation.

THE Rogers Locomotive Works at Paterson, N. J., are to be closed permanently, according to reports, about the end of the year, and the property will be sold. Contracts now on hand will keep the works in operation till Dec. 1, but no more orders will be taken Paterson at one time had three flourishing locomotive-building establishments, the Grant, the Cooke and the Rogers. The Grant works, after years of inactivity was moved to Chicago, and after an unsuccessful attempt at operation there was transformed to a manufactory

40 Brands of PIG IRON.

20 Years of Experience

In the Pig Iron and Coke business has enabled us to secure an unequaled line of Blast Furnace and Coke Oven connections.

We are prepared to supply promptly the best brands of

HIGH SILICON BESSEMER
MALLEABLE FOUNDRY
CAR WHEEL FORGE

Pig Iron from furnaces located in all the producing sections of the U. S. Also

10 Brands of Foundry Coke.

72 HOUR FOUNDRY, 48 HOUR FURNACE COKE

from Connellsville, Pocahontas, New River, Virginia and Alabama.

Inquiries are respectfully solicited.

ROGERS, BROWN & CO.,

CINCINNATI, BUFFALO, ST. LOUIS, CHICAGO, PHILADELPHIA, CLEVELAND, BIRMINGHAM, NEW YORK, PITTSBURG, BOSTON.

MOUNT SAVAGE FIRE BRICK.

UNION MINING CO.

ESTABLISHED 1841.
CAPACITY,
60,000 PER DAY; 18,000,000 PER YEAR.
The First Manufactory of Its Kind in the United States.

Proprietors of the
Celebrated
Mount Savage Fire Brick.
GOVERNMENT STANDARD.

Home Office and Works: MOUNT SAVAGE, Allegany County, Maryland.
Branch Offices: No. 1 Broadway, NEW YORK, N. Y.; Land Title Bldg., Broad & Chestnut Sts., PHILADELPHIA, PA.; Park Building, PITTSBURGH, PA.; Stowe, Fuller & Co., 249 Arcade, CLEVELAND, O.; N. A. Williams Co., 219 E. Washington St., CHICAGO, ILL.

Use IRONSIDES PAINTS
for roofs, boiler fronts, stacks, and all metal work.
Ironsides Rope and Gear Lubricants.
Get Catalogue L.
THE IRONSIDES COMPANY, COLUMBUS, O. U. S. A.

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Cleveland, O.
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"OTIS" FIRE-BOX PLATES A SPECIALTY.
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Steel Castings from 100 to 75,000 lbs.
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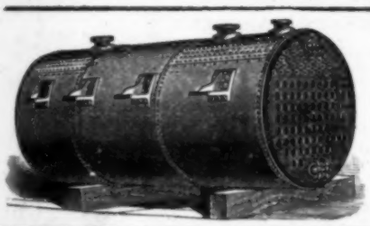

E. KEELER COMPANY,
Manufacturers of
Boilers, Tanks, and Self-Supporting Stacks, Complete Power Plants.
STEAM HEATING IN ALL BRANCHES.
WILLIAMSPORT, PA.

Castings and Machine Work
Having the best foundry and machine shop facilities, we solicit correspondence in this line. Promptness of delivery and work guaranteed.
ENTERPRISE MFG. CO.,
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JEROME KEELEY & CO.,
ESTABLISHED 1869.
421 CHESTNUT ST., PHILADELPHIA.
PIG IRON, IRON ORES AND COKE.
Consulting Engineers in Metallurgy and Mining. Steel and Iron Blooms, Muck Bar, etc.

Advertisements that are studied, that are to the point and that are frequently changed, bring best results.

trical machinery. The closing of the Rogers works will leave the Cooke plant the only one in operation in Paterson. The Rogers works has been in operation as an iron-working establishment since 1800; and locomotives have been built there since 1852. The recent death of the president of the company, Mr. Robert S. Hughes, and the desire of the principal stockholder, Mr. Jacob S. Rogers, to close out his interest are said to have brought about the decision to close the works. It is said that the cause for liquidation is mainly the lack of facilities for competing with the other great plants in the country, which have been able to avail themselves of labor and expense-saving machinery. In shutting down 1,400 men, all living in Paterson, will be thrown out of employment. The pay roll of the company averaged $25,000 a week during the whole of the year. A call has been issued for a meeting of the business men of Paterson to make plans for the retention of the Rogers Locomotive Works as an active industry. Jacob S. Rogers has agreed to a plan to turn over the plant to a stock company of citizens on reasonable terms. A conference of leading men agreed that $500,000 would have to be raised.

Excursions to Richmond, Va., Via Pennsylvania Lines.

Sept. 13, 14, 15 and 16, for Sovereign Grand Lodge I. O. O F. Convention. Excursion tickets will be sold to Richmond, Va., via Pennsylvania Lines, good returning Tuesday, Sept. 25, inclusive.

I. O. O. F. Special Excursion

to Richmond, Va., via B. & O. R. R. Tickets on sale Sept. 13, 14, 15, 16. Rate from Cleveland, $14 round trip. Call at

FORGINGS

RAILROAD, SPECIAL AND TELEPHONE FORGINGS

BOLTS AND RIVETS, LAG SCREWS, AIR BRAKE PINS, ETC., ETC.

THE VULCANUS FORGING CO.,
CLEVELAND, OHIO.

Ore and Coal Handling Machinery

For Blast Furnaces, Docks and Mines,
MINING MACHINERY,
HIGH GRADE HOISTING ENGINES.

WEBSTER, CAMP & LANE MACHINE CO., Akron, Ohio.

Molders' Text Book.

Being Part II of American Foundry Practice, giving the best methods and rules for obtaining good castings, with detailed description for making molds. A thoroughly practical book that should be in the hands of every molder. By Thomas D. West. 460 pages cloth..... $2.50

The Iron Trade Review Co.

Conestoga Building, EDWARD E. ERIKSON, PITTSBURG, PA.
Regenerative Gas Furnaces and Water Seal Gas Producers.
Producer Gas under Tubular Boilers, saving 20 per cent in fuel. NO SMOKE.

FIRE BRICK.

BRANDS:
O. K. CROWN.
O. K.
A.

SUITABLE FOR
Furnace, Malleable, Mill, Foundry and Lime Kiln Work.

OAK HILL FIRE BRICK AND COAL CO.,
OAK HILL, OHIO.

FIRE BRICK

CHAS TAYLOR'S SONS CO.
Manufacturers of
FIRE BRICK and ENAMELED BRICK.
SHAPEWORK OUR SPECIALTY.
CINCINNATI, O.
Workers of Carter County (Kentucky) Clay.

Molder's Text Book, Price $2.50.

PHOENIX HORSE SHOES—ARE THE BEST HORSE SHOES MADE

CATALOGUE SENT ON REQUEST.

PHOENIX HORSE SHOE CO., POUGHKEEPSIE, N. Y.—JOLIET, ILL.

The Champion Rivet Co.,

CLEVELAND, O., U. S. A.

Victor Boiler and Structural Rivets

FINISH UNEXCELLED. QUALITY HIGHEST STANDARD.
GOVERNMENT WORK A SPECIALTY.

"13"

Within the month of July, 1900, we had orders upon our books for thirteen different blast furnace linings, crucibles, boshes and inwalls, going north, east, south and west. We believe this record to be unequalled and offer it as an advertisement of the fact that we make the best blast furnace and hot blast stove material made in the United States today.

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D. & C. Steamers leave Cleveland and Detroit every morning except Sunday at 9:30 A.. M.; arrive at destination seven hours later, giving a delightful daylight ride across Lak Erie. Fare, only one dollar each direction. Send 2 cents for illustrated pamphlet. Address A. A. Schantz, G. P. A., D. & C. Line, Detroit, Mich.

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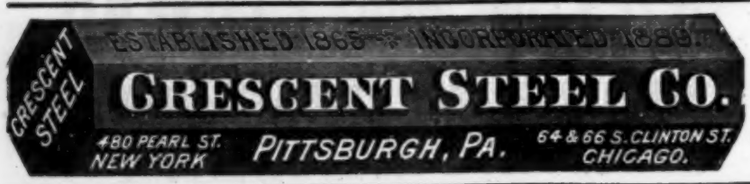

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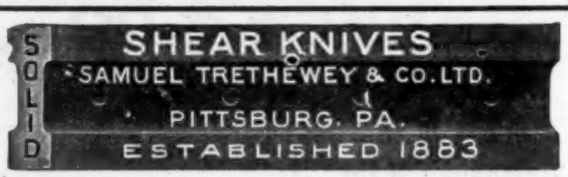

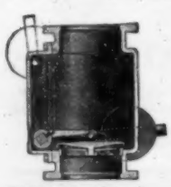

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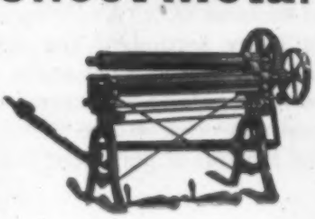

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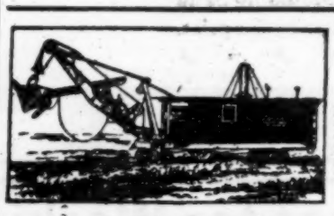

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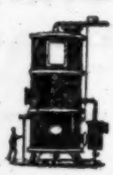

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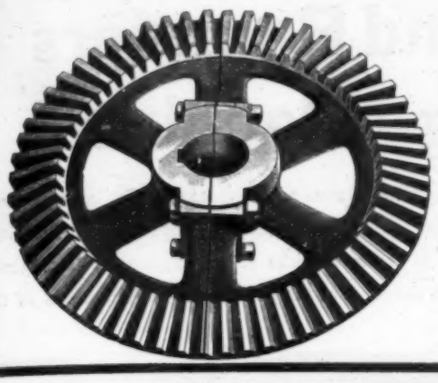

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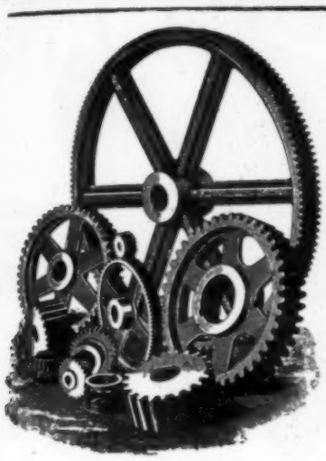

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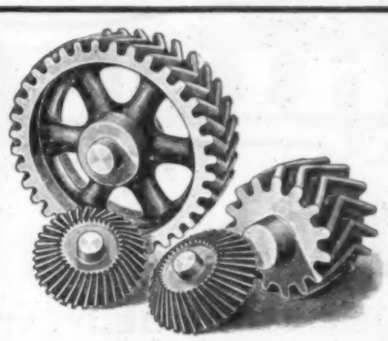

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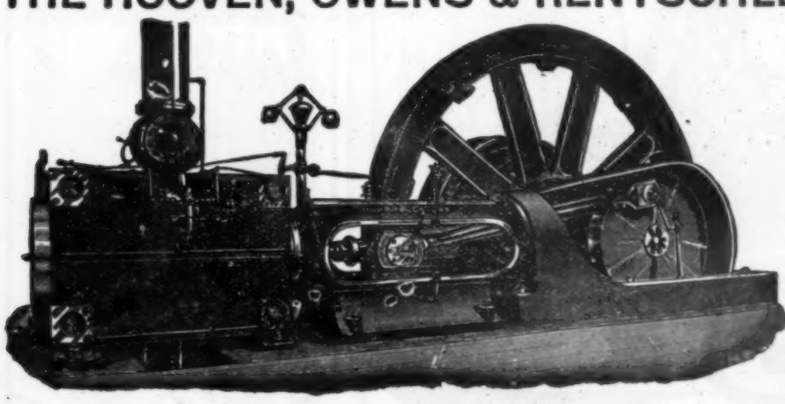

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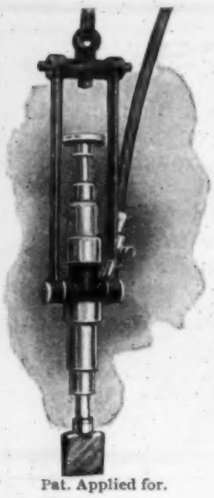

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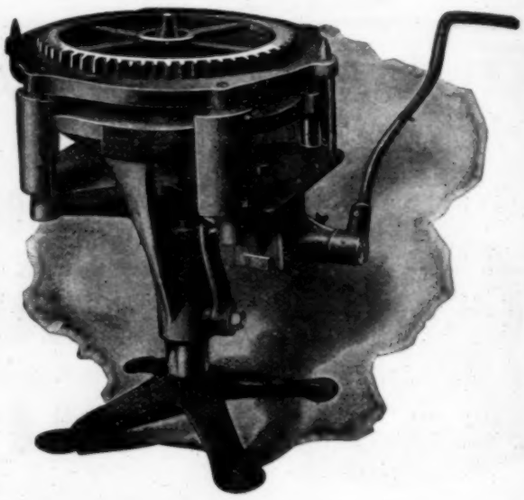

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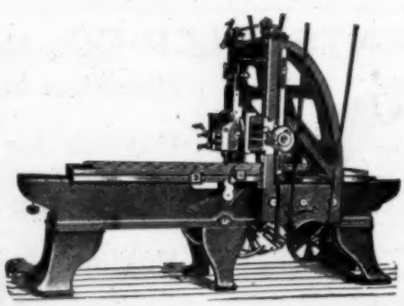

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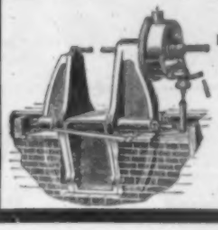

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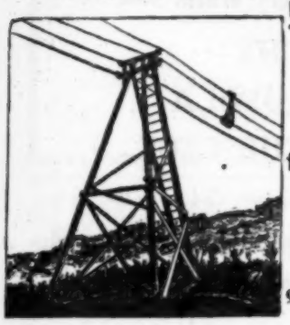

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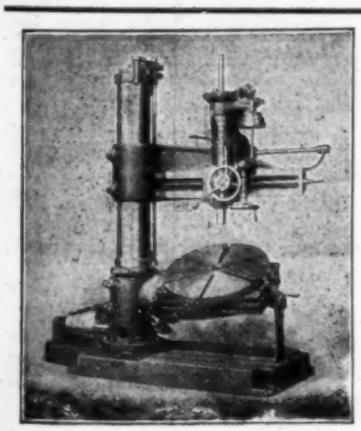

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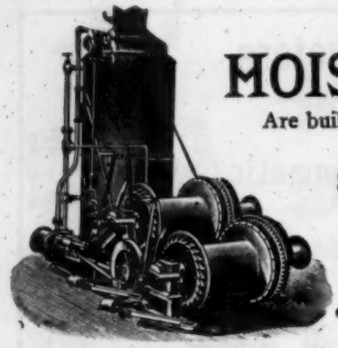

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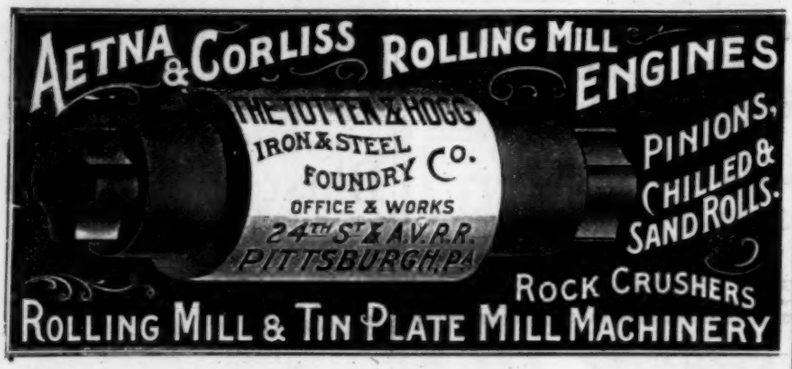
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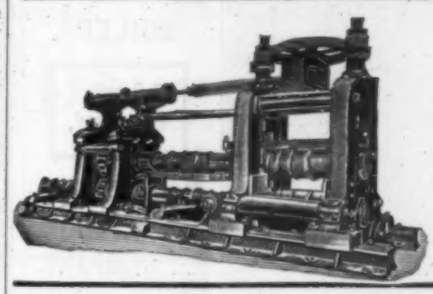

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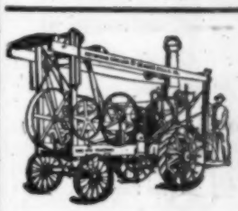

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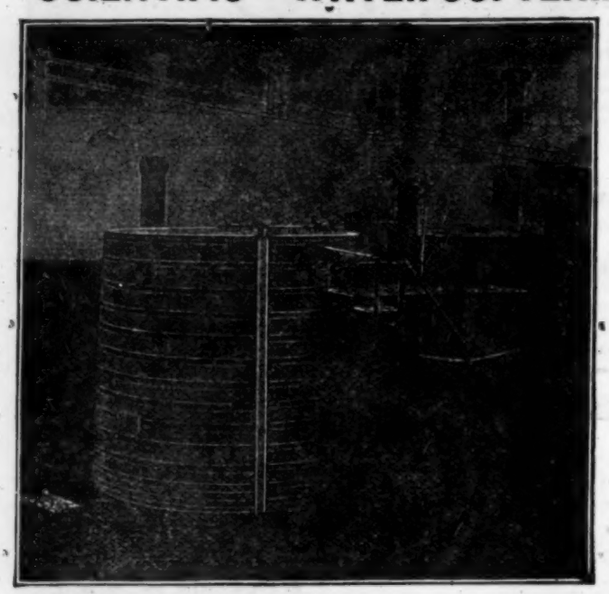

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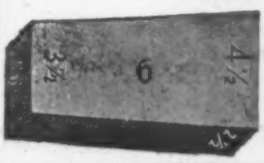

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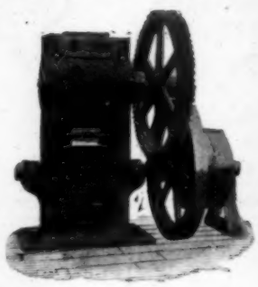

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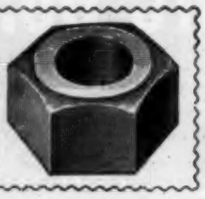

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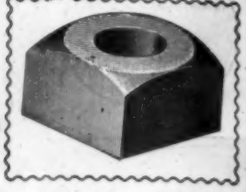

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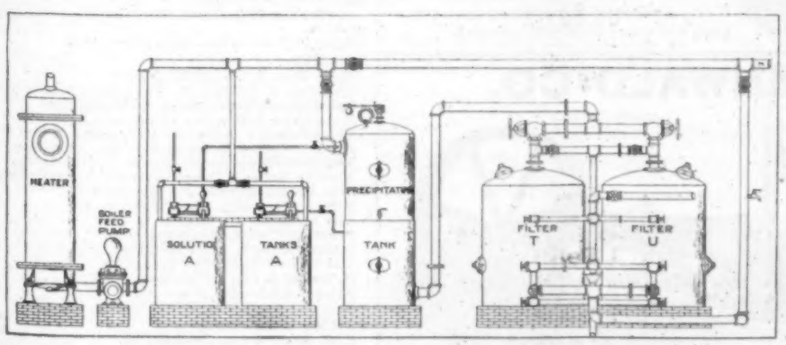

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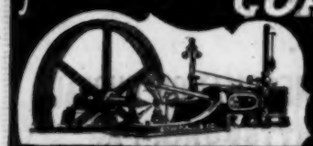

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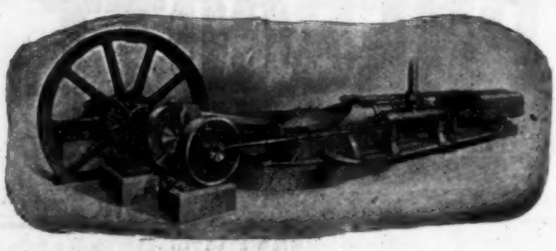

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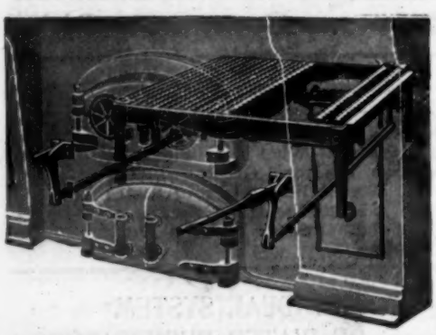

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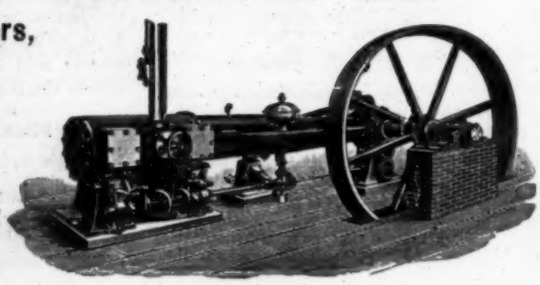

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J. J. Ryan & Co., Chicago, Ill.
Lorain Foundry Co., Lorain, O.

CASTINGS (MALLEABLE)—
Acme Steel & Malleable Iron Works, Buffalo.

CASTINGS (Steel)—
Bethlehem Steel Co., South Bethlehem, Pa.
Otis Steel Co., Cleveland, O.
Acme Steel & Malleable Iron Works, Buffalo, N. Y.

CEMENT—
Garden City Sand Co., Chicago, Ill.
Reed F. Blair & Co., Pittsburg, Pa.

CHAIN—
Standard Chain Co., Pittsburg, Pa.

CHAIN BELTING—
Heyl & Patterson, Pittsburg, Pa.
Jeffrey Mfg. Co., Columbus, O.
Link-Belt Machinery Co., Chicago, Ill.
The Aultman Co., Canton, O.

CHANNELERS—
The Ingersoll-Sergeant Drill Co., New York.

CHANNELS—
American Steel Hoop Co., New York City.

CHEMISTS—
F. A. Emmerton, Cleveland, O.
O. Textor, Cleveland, O.
The R. W. Hunt & Co., Chicago, Ill.
Grasselli Chemical Co., Cleveland, O.
We Fu Go Co. Cincinnati, O.

CHILLED AND SAND ROLLS—
Wm. Tod & Co., Youngstown, O.
Seaman, Sleeth Co., Pittsburg, Pa.
Totten & Hogg Iron and Steel Foundry Co., Pittsburg, Pa.
Lorain Foundry Co., Lorain, O.
The Lloyd Booth Co., Youngstown, O.
West Penn Foundry & Machine Co., Avonmore, Pa
Frank-Kneeland Machine Co., Pittsburg, Pa.
A. Garrison Foundry Co., Pittsburg, Pa.

COAL CUTTERS—
The Ingersoll-Sergeant Drill Co., New York.
Jeffrey Mfg. Co., Columbus, O.
Link Belt Machinery Co., Chicago, Ill.

COAL SCREENS—
Hendrick Mfg. Co., Carbondale, Pa.
Rob't. Aitchinson Per. Metal Co., Chicago, Ill.
Jeffrey Mfg. Co., Columbus, O.
The Aultman Co., Canton, O.
Western Machinery & Supply Co., Chicago, Ill.

COAL AND COKE—
M. A. Hanna & Co., Cleveland, O.
Rogers, Brown & Co., Cincinnati, O
Jerome Keeley & Co., Philadelphia, Pa.
Reed F. Blair & Co., Pittsburg, Pa.
Pilling & Crane, Philadelphia, Pa.
Pickand, Brown & Co., Chicago, Ill.
H. C. Frick Coke Co., Pittsburg, Pa.
McKeefrey & Co., Leetonia, O.
Pickands, Mather & Co., Cleveland, O.
J. H. Hillman & Son, Pittsburg, Pa.
Cherry Valley Iron Co., Pittsburg, Pa.
Bessemer Coke Co., Pittsburg, Pa.
Alabama Consolidated Coal & Iron Co, Birmingham, Ala.
Tennessee Coal, Iron & Railroad Co., Birmingham, Ala.

COAL HANDLING MACHINERY—
A. Leschen & Sons Rope Co., St. Louis, Mo.

COAL MINING MACHINERY—
Jeffrey Mfg. Co., Columbus, O.
Webster Camp & Lane Machine Co., Akron, O.
Link Belt Machinary Co., Chicago, Ill.
A. Leschen & Sons Rope Co., St. Louis, Mo.

COMPAROMETERS—
Vulcan Mfg. Co., Pittsburg, Pa.

COMPRESSION COUPLINGS—
The Aultman Co., Canton, O.
Geo. B. Sennett Co., Youngstown, Ohio.

CONDENSERS—
Stilwell-Bierce & Smith-Vaile Co., Dayton, O.

CONTRACTORS' SUPPLIES—
A. Leschen & Sons Rope Co., St. Louis, Mo.

CONVEYING MACHINERY—
A. Leschen & Sons Rope Co., St. Louis, Mo.

CONVEYORS—
Jeffrey Mfg. Co. Columbus, O.
Link-Belt Machinery Co., Chicago, Ill.
Exeter Machine Works, Pittston, Pa.
The Aultman Co., Canton, O.
The Brown Hoisting and Conveying Machine Co., Cleveland, O.
Webster Camp & Lane Machine Co., Akron, O.

COPPER GASKETS—
Drake Acetylene Apparatus Co., Cleveland, O.

CORRUGATED IRON—
Berger Mfg. Co., Canton, O.
Wm. B. Scaife & Sons, Pittsburg, Pa.
American Sheet Steel Co., New York City.

COTTON TIES—
American Steel Hoop Co., Pittsburg, Pa.
American Steel & Wire Co., Chicago, Ill.

CRANES—
Cleveland Punch & Shear Wks. Co., Cleveland, O.
Northern Engineering Works, Detroit, Mich.
Wm. Tod & Co., Youngstown, O.
Marion Steam Shovel Co., Marion, O.
The Bucyrus Co., South Milwaukee, Wis.
Brown Hoisting and Conveying Machine Co., Cleveland, Ohio.
Cleveland Crane & Car Co., Cleveland, O.
Whiting Foundry Equipment Co., Harvey, Ill.
Atlas Machine Co., Pittsburg, Pa.

CRANES AND DERRICKS—
A. Leschen & Sons Rope Co., St. Louis, Mo.

CRANK PINS—
Bethlehem Steel Co., S. Bethlehem, Pa.

CUPOLAS—
Riter-Conley Mfg. Co., Pittsburg, Pa.
Northern Engineering Works, Detroit, Mich.
The United Boiler Co., Girard, O.
Wm. B. Pollock Co., Youngstown, O.
Whiting Foundry Equipment Co., Harvey, Ill.

DIES—
Danielson Machine & Tool Co., Cleveland, O.
American Steel & Wire Co., Chicago, Ill.

DREDGES—
Marion Steam Shovel Co., Marion, O.
The Bucyrus Co., South Milwaukee, Wis.
The Jeffrey Mfg. Co., Columbus, O.
Thew Automatic Shovel Co., Lorain, O.

DRILL GRINDERS—
J. Wendell Cole Columbus, O.

DRILLING MACHINERY—
Keystone Driller Co., Beaver Falls, Pa.

DRILL PRESSES—
Cleveland Punch & Shear Wks. Co., Cleveland, O.
C. H. Besly & Co., Chicago, Ill.
U. Baird Machinery Co., Pittsburg, Pa.
Bickford Drill & Tool Co., Cincinnati, O.
Danielson Machine & Tool Co., Cleveland, O.

DROP FORGINGS—
Wyman & Gordon, Worcester, Mass.
Chicago Drop Forge & Foundry Co., Kensington, Ill.
Jas. H. Baker Mfg. Co., Pittsburg, Pa.
Frankford Steel & Forging Co., Philadelphia, Pa.
E. D. Clapp Mfg. Co, Auburn, N. Y.

DROP HAMMERS—
Cleveland Punch & Shear Wks. Co., Cleveland, O.

DROP PRESSES—
Avery Stamping Co., Cleveland, O.
Bertsch & Co., Cambridge City, Ind.
C. H. Besly & Co., Chicago, Ill.
E. Konigslow & Bro., Cleveland, O.
Danielson Machine & Tool Co., Cleveland, O.
Cleveland Punch & Shear Wks. Co., Cleveland, O.
Bethlehem F'dry & Mach. Co., Bethlehem, Pa.

DYNAMOS—
Jeffrey Mfg. Co., Columbus, O.

EAVE TROUGHS AND CONDUCTORS—
Berger Mfg. Co., Canton, O.

ELECTRICAL MACHINERY SUPPLIES—
A. Leschen & Sons Rope Co., , Louis, Mo.
Pelton Engineering Co., Cleveland, O.

ELECTRICAL WIRES AND CABLES—
American Steel & Wire Co., Chicago, Ill.

ELEVATING AND CONVEYING MACHINERY
Jeffrey Mfg. Co., Columbus, O.
Link-Belt Machinery Co., Chicago, Ill.
Lidgerwood Mfg. Co., New York City.
Exeter Machine Works, Pittston, Pa.
The Aultman Co., Canton, O.
The Brown Hoisting and Conveying Machine Co., Cleveland, O.
Webster Camp & Lane Machine Co., Akron, O

EMERY AND CORUNDUM WHEELS—
C. H. Besley & Co., Chicago, Ill.
J. Wendell Cole, Columbus and Chicago.
Northampton Emery Wheel Co., Chicago, Ill.

EMERY WHEEL MACHINERY—
J Wendell Cole, M.E., Columbus, O., or Chicago
C. H. Besly & Co., Chicago, Ill.
Northampton Emery Wheel Co., Chicago, Ill.

ENGINEERS AND CONTRACTORS—
Wellman-Seaver Engineering Co., Cleveland, O.
Walter Kennedy, Pittsburg, Pa.
Heyl & Patterson, Pittsburg, Pa.
Meehan Boiler & Construction Co. Lowellville,
E. E. Erickson, Pittsburg, Pa.
Riter-Conley Mfg. Co., Pittsburg
Julian Kennedy, Pittsburg, Pa.
Jeffrey Mfg. Co., Columbus, O.
Alex Laughlin & Co., Pittsburg,
We Fu Go Co., Cincinnati, O.
James Bonar & Co., Pittsburg, Pa.

ENGINE PACKING—
Jenkins Bros., New York City.
C. H. Besly & Co., Chicago, Ill.
James B. Clow & Sons, Chicago, Ill.

ENGINEERS' SUPPLIES—
C. H. Besly & Co., Chicago, Ill.
Jenkins Bros., New York City.
James B. Clow & Sons, Chicago, Ill.
Wright Mfg. Co., Cleveland, O.
Drake Acetylene Apparatus Co., Cleveland, O.

ENGINE LATHES—
U. Baird Machinery Co., Pittsburg, Pa.

ENGINES (OIL)—
The Aultman Co., Canton, O.

ENGINES (STEAM)—
Wm. Tod & Co., Youngstown, O.
The Edward P. Allis Co., Milwaukee, Wis.
The Hooven, Owens & Rentschler Co., Hamilton, O.
The Aultman Co., Canton, O.
Geo. B. Sennett Co., Youngstown, Ohio.
E. Keeler & Co., Williamsport, Pa.
Vulcan Iron Works, Wilkes-Barre, Pa.

FEED WATER HEATERS AND PURIFIERS—
Harrison Safety Boiler Works, Philadelphia, Pa.
James Bonar & Co., Pittsburg, Pa.
We Fu Go Co., Cincinnati, O.
Stilwell-Bierce & Smith-Vaile Co., Dayton, O.

FELLOE PLATES—
Avery Stamping Co., Cleveland, O.

FILES, MAKERS OF—
C. H. Besly & Co., Chicago, Ill,

FILTER PRESSES—
Stilwell-Bierce & Smith-Vaile Co., Dayton, O.

FILTERS—
Wm. B. Scaife & Sons, Pittsburg, Pa.
Pittsburg Filter Mfg. Co., Pittsburg, Pa.

FIRE BRICK AND CLAY—
J. V. Rose, Sharon, Pa.
Union Mining Co., Mt. Savage, Md.
Clearfield Fire Brick Co., Clearfield, Pa.
Dover Fire Brick Co., Cleveland, O.
F. B. Stevens, Detroit, Mich.
Chicago Fire Brick Co., Chicago, Ill.
Scioto Star Fire Brick Works, Portsmouth, O.
Kentucky Fire Brick Works, Portsmouth O.
Webster Fire Brick Co., South Webster, O.
Oak Hill Fire Brick & Coal Co., Oak Hill, O.
F. B. Holmes & Co., Detroit, Mich.
W. H. Haws Fire Brick Co., Mt. Union, Pa.
Garden City Sand Co., Chicago, Ill.
A. P. Smith & Co., New Brighton, Pa.
Chas. Taylor's Sons Co. Cincinnati, O.
A. J. Hawes & Son, Johnstown, Pa.
Scioto Fire Brick Co., Sciotoville, O.

FIRE PROOF COVERING—
C. H. Besly & Co., Chicago, Ill.

FOOT AND POWER LATHES—
U. Baird Machinery Co., Pittsburg, Pa.

FORGINGS—
Chicago Drop Forge & Foundry Co., Kensington, Ill.
Cleveland City Forge & Iron Co., Cleveland, O
Bethlehem Steel Co. South Bethlehem, Pa.
Wyman & Gordon, Worchester, Mass
Danielson Machine & Tool Co. Cleveland, O.
Samuel Trethewey & Co. Pittsburg, Pa.
Jas H. Baker Mfg. Co., Pittsburg, Pa.
Frankford Steel & Forging Co., Philadelphia, Pa.
Pilling & Crane, Philadelphia, Pa.
Vulcanus Forging Co., Cleveland, O.
E. D. Clapp Mfg. Co., Auburn, N. Y.

FOUNDRIES—
Wm. Tod & Co., Youngstown, O.
Seaman, Sleeth Co., Pittsburg, Pa.
Hooven, Owens & Rentschler Co., Hamilton, O.
Link Belt Machinery Co., Chicago, Ill.
W. A. Jones Foundry Co., Chicago.
Jeffrey Mfg. Co., Columbus, O.
Brass Founders' Supply Co., Newark, N. J.
The Aultman Co., Canton, O.
Schuylkill Iron & Steel Co., Philadelphia, Pa.
Wheeling Mold & Foundry Co., Wheeling, W. Va.
Enterprise Mfg. Co., Columbiana, O.

FOUNDRY EQUIPMENT.
Tabor Mfg. Co., Elizabeth, N. J.
Brass Founders Supply Co., Newark, N. J.
Vulcan Mfg. Co., Pittsburg, Pa.
Northern Engineering Works, Detroit, Mich.
Cleveland Crane & Car Co., Cleveland, O.
Thos. Furlow & Son, Philadelphia, Pa.
Maywood Foundry & Machine Co., Chicago, Ill.

FOUNDRY FACINGS—
Cleveland Facing Mill Co., Cleveland, O.

FOUNDRY SUPPLIES—
Northern Engineering Works, Detroit, Mich.
Chas. Taylor's Sons Co., Cincinnati, O.
Clearfield Fire Brick Co., Clearfield, Pa.
Cleveland Crane & Car Co., Cleveland, O.
Thos. Furlow & Son, Philadelphia, Pa.
The Ohio Sand Co., Conneaut, O.
Union Mining Co., Mt. Savage, Md.
Dover Fire-Brick Co., Cleveland, O.
A. P. Smith & Co., New Brighton, Pa.
Tabor Mfg. Co., Elizabeth, N. J.
F. B. Stevens, Detroit, Mich.
W. H. Haws Fire Brick Co., Mt. Union, Pa.
Cleveland Facing Mill Co., Cleveland, O.
Garden City Sand Co., Chicago, Ill.
Chicago Fire Brick Co., Chicago, Ill.
Brass Founders' Supply Co., Newark, N. J.
Vulcan Mfg. Co., Pittsburg, Pa.
Scioto Star Fire Brick Works, Portsmouth, O.
Kentucky Fire Brick Works, Portsmouth, O.
Webster Fire Brick Co., South Webster, O.
J. V. Rose, Sharon, Pa.
Oak Hill Fire Brick & Coal Co., Oak Hill, O.
F. B. Holmes & Co., Detroit, Mich.
Maywood Foundry & Machine Co., Chicago, Ill.
A. J. Haws & Son, Johnstown, Pa.
Webster Foundry Sand Co., Philadelphia, Pa.
Scioto Fire Brick Co., Sciotoville, O.

FRICTION METAL—
James B. Clow & Sons, Chicago, Ill.
Theo. Hiertz & Son, St. Louis, Mo.
C. H. Besly & Co., Chicago, Ill.
Swarts Metal Refining Co., Chicago, Ill.
Perfect Lubricating Metal Co., Cincinnati, O.
J. J. Ryan & Co., Chicago. Ill.

FURNACE LININGS—
Union Mining Co., Mt. Savage, Md.

FUEL OIL BURNERS—
Rockwell Engineering Co., New York City.

GALVANIZED IRON—
American Sheet Steel Co., New York City.
McCullough Iron Co., Wilmington, Del.

GALVANIZERS—
American Sheet Steel Co., New York City.

GALVANIZING POTS—
The Wm. B. Pollock Co., Youngstown, O.

GAS ENGINES—
Northern Engineering Works, Detroit, Mich.
Columbus Machine Co., Columbus, O.
Atlas Machine Co., Pittsburg, Pa.

GAUGE COCKS—
James Bonar & Co., Pittsburg, Pa.

GEARING—
I. & R. Greenwald Co., Cincinnati, O.
The R. D. Nuttall Co., Allegheny, Pa.
The Van Dorn & Dutton Co., Cleveland, O.
F. H. Bultman & Co., Cleveland, O.
Fraser & Chalmers, Chicago, Ill.
Southwark Foundry & Machine Co., Philadelphia, Pa.
James Bonar & Co., Pittsburg, Pa.
Link Belt Machinery Co., Chicago, Ill.
Stilwell-Bierce & Smith-Vaile Co., Dayton, O.

GEAR CUTTERS—
F. H. Bultman & Co., Cleveland, O.

GEAR CUTTING—
The R. D. Nuttall Co., Allegheny, Pa.
The Van Dorn & Dutton Co., Cleveland, O.
F. H. Bultman & Co., Cleveland, O.

GEAR LUBRICANTS—
The Ironsides Company, Columbus, O.

GIRDER WORK—
Wm. B. Scaife & Sons, Pittsburg, Pa.

GRINDSTONES—
C. H. Besly & Co., Chicago, Ill.

GRAPHITE PAINT—
Jos Dixon Crucible Co., Jersey City, N. J.

GRATE BARS—
Geo. B. Sennett Co., Youngstown, Ohio.

HACK SAWS—
Cleveland Punch & Shear Wks. Co., Cleveland, O

HANGERS—
E. A. Delano, Chicago, Ill.
Dodge Mfg. Co., Mishawaka, Ind.
The Aultman Co., Canton, O.
I. & R. Greenwald Co., Cincinnati, O.
Link Belt Machinery Co. Chicago, Ill.

HARNESS SNAPS—
Covert Mfg. Co., West Troy, N. Y.

HEATERS AND PURIFIERS—
Harrison Safety Boiler Works Philadelphia.
James Bonar & Co., Pittsburg, Pa.
Wefugo Co., Cincinnati, O.
The United Boiler Co., Girard, O

HEAVY HARDWARE—
C. H. Besly & Co., Chicago, Ill.

HOISTS—
The Aultman Co., Canton, O.
Lidgerwood Mfg. Co., New York City.

HOISTING ENGINES—
The Edward P. Allis Co., Milwaukee, Wis
Lidgerwood Mfg. Co. New York City.
Exeter Machine Works, Pittston, Pa.
The Aultman Co., Canton, O.
Webster, Camp & Lane Machine Co., Akron, O.
Vulcan Iron Works, Wilkes-Barre, Pa.

HOISTING MACHINERY—
Exeter Machine Works, Pittston, Pa.
Link-Belt Machinery Co., Chicago, Ill.
Jeffrey Mfg. Co., Columbus, O.
Lidgerwood Mfg. Co., New York City.
The Aultman Co., Canton, O.
The Brown Hoisting and Conveying Machine Co., Cleveland, O.
Webster, Camp & Lane Machine Co., Akron, O.
A. Leschen & Sons Rope Co., St. Louis, Mo.

HOISTING ROPE (WIRE)—
American Steel & Wire Co., Chicago, Ill.

HOLLOW SHAFTING—
Atlantic Tube Co., Pittsburg, Pa.

HORSE SHOES—
Phoenix Horse Shoe Co., Joliet, Ill
American Steel & Wire Co., Chicago, Ill.

INDUSTRIAL CARS—
The Pressed Steel Car Co., Pittsburg, Pa.

INGOT MOLDS—
Lorain Foundry Co., Lorain, O.

INJECTORS—
C. H. Besly & Co., Chicago, Ill.
James Bonar & Co., Pittsburg, Pa.

INSURANCE COMPANIES—
Hartford Steam Boiler I. & I. Co., Hartford, Ct.

IRON BUILDINGS—
Illinois Steel Co., Chicago, Ill.
Riter-Conley Co., Pittsburg, Pa.
Wm. B. Scaife & Sons, Pittsburg, Pa.
American Bridge Co., New York City.

IRON, NAILS AND STEEL—
C. H. Besly & Co., Chicago, Ill.

IRON AND STEEL ROOFING—
Berger Mfg. Co., Canton, O.
Wm. B. Scaife & Sons, Pittsburg, Pa.
McCullough Iron Co., Wilmington, Del.

IRON ORE—
Lake Superior Consolidated Iron Mines New York City, N. Y.
Ogiebay, Norton & Co., Cleveland, O.
Pickands, Brown & Co., Chicago, Ill.
M. A. Hanna & Co., Cleveland, O.
Drake Bartow & Co., Cleveland, O.
Pickands, Mather & Co., Cleveland, O.
J. Wesley Pullman, Philadelphia, Pa.
Tod, Stambaugh & Co., Cleveland, O.
Jerome Keeley & Co., Philadelphia, Pa.

IRON WORKING MACHINERY—
Atlas Machine Co., Pittsburg, Pa.

IRON WORKING TOOLS—
Avery Stamping Co., Cleveland, O.
Cleveland Punch & Shear Wks. Co., Cleveland, O.
H. Bickford, Lakeport, N. H.
C. H. Besly & Co., Chicago, Ill.
U. Baird Machinery Co., Pittsburg, Pa.
Armstrong Bros. Tool Co., Chicago, Ill.
F. H. Bultman & Co., Cleveland, O.
The Armstrong Mfg. Co., Bridgeport, Conn.
Bickford Drill & Tool Co., Cincinnati, O.
Bertsch & Co., Cambridge City, Ind.
Thos. P. Conard, Philadelphia, Pa.
C. C. Wormer Machinery Co., Detroit, Mich.
Carlin Machinery & Supply Co., Allegheny, Pa.
Bethlehem F'dry & Mach. Co., S. Bethlehem, Pa.

LADLES—
Northern Engineering Works, Detroit, Mich.
The United Boiler Co., Girard, O.
Wm. B. Pollock Co., Youngstown, O.
Whiting Foundry Equipment Co., Harvey, Ill.

LAG SCREWS—
Vulcanus Forging Co., Cleveland, O.

LATHES—
U. Baird Machinery Co., Pittsburg, Pa.
Bickford Drill & Tool Co., Cincinnati, O.
Danielson Machine & Tool Co., Cleveland, O.

LINK BELTING—
The Jeffrey Mfg. Co., Columbus, O.
Link-Belt Machinery Co., Chicago, Ill.
Heyl & Patterson, Pittsburg, Pa.
The Aultman Co., Canton, O.

LOCOMOTIVES—
Hyde Bros. & Co., Pittsburg, Pa.

LUBRICANTS—
The Ironsides Co., Columbus, O.

MACHINE TOOLS—
H. Bickford, Lakeport, N. H.
C. H. Besly & Co., Chicago, Ill.
U. Baird Machinery Co., Pittsburg, Pa.
Bertsch & Co., Cambridge City, Ind.
Armstrong Bros. Tool Co., Chicago, Ill.
Bickford Drill & Tool Co., Cincinnati, O.
Danielson Machine & Tool Co., Cleveland, O.
F. H. Bultman & Co., Cleveland, O.
Cleveland Punch & Shear Wks. Co., Cleveland, O.
Carlin Machinery & Supply Co., Allegheny, Pa.
C. C. Wormer Machinery Co., Detroit, Mich.
Bethlehem F'dry & Mach. Co., S. Bethlehem, Pa.
Pelton Engineering Co., Cleveland, O.
Atlas Machine Co., Pittsburg, Pa.
Geo. H. Bowler, Cleveland, O.
J. A. Burke, Chicago, Ill.

MACHINE SCREWS—
C. H. Besly & Co., Chicago, Ill.

MACHINERY AND TOOL STEEL—
C. H. Besly & Co., Chicago, Ill.
Braeburn Steel Co., Braeburn, Pa
Crescent Steel Co., Pittsburg, Pa.
La Belle Steel Co., Pittsburg, Pa
Byron H. White, Chicago, Ill.
Morris & Bailey Steel Co., Pittsburg, Pa.
Monongahela Iron & Steel Co., Pittsburg, Pa.
American Steel & Wire Co., Chicago, Ill.

MAGNESIA COVERING—
C. H. Besly & Co., Chicago, Ill.
James B Clow & Sons, Chicago, Ill.

MALLEABLE CASTINGS—
Acme Steel & Malleable Iron Works, Buffalo, N. Y.
Link Belt Machinery Co., Chicago, Ill.

MANILLA ROPE—
A. Leschen & Sons Rope Co., St. Louis, Mo.

MANILLA ROPE COATING—
The Ironsides Co., Columbus, O.

MANUFACTURING CHEMISTS—
Wefugo Co., Cincinnati, O.
Grasselli Chemical Co., Cleveland, O.

METAL BEARINGS—
Theo. Hiertz & Son, St. Louis, Mo.
C. H. Besly & Co., Chicago, Ill.
Perfect Lubricating Metal Co., Cincinnati, O.
Swarts Metal Refining Co., Chicago, Ills.
J. J. Ryan & Co., Chicago, Ill.

METAL CEILINGS—
Berger Manufacturing Co., Canton, O.

METAL WORK—
Avery Stamping Co., Cleveland, O.

MILL CASTINGS—
Schuylkill Iron & Steel Co., Philadelphia, Pa.
A. Garrison Foundry Co., Pittsburg, Pa.

MILLING MACHINES—
U. Baird Machinery Co., Pittsburg, Pa.
Danielson Machine & Tool Co., Cleveland, O.

MINING MACHINERY—
C. H. Besly & Co., Chicago, Ill.
The Edward P. Allis Co., Milwaukee, Wis.
Jeffrey Mfg. Co., Columbus, O.
Lidgerwood Mfg. Co., New York City.
Exeter Machine Works, Pittson, Pa.
Wm. Cramp & Sons, Philadelphia, Pa
The Bucyrus Co., South Milwaukee, Wis.
Marion Steam Shovel Co., Marion, O.
Webster, Camp & Lane Machine Co., Akron, O.
Fraser & Chalmers, Chicago, Ill.
Wm. B. Pollock Co., Youngstown, O.
Link Belt Machinery Co., Chicago, Ill.
Thew Automatic Shovel Co., Lorain, O.
A. Leschen & Sons Rope Co., St. Louis, Mo.
Carlin Machinery & Supply Co., Allegheny, Pa.
Vulcan Iron Works, Wilkes-Barre, Pa.

MINE PUMPS—
F. M. Prescott Steam Pump Co., Milwaukee, Wis
Stilwell-Bierce & Smith-Vaile Co., Dayton, O.

MOLDING MACHINES—
Tabor Mfg. Co., Elizabeth, N. J.
Thos. Furlow & Son, Philadelphia, Pa.
Maywood Foundry & Machine Co., Chicago, Ill.
Whiting Foundry Equipment Co., Harvey, Ill.

MOLDING SAND—
Ohio Sand Co., Conneaut, O.
F. B. Stevens, Detroit, Mich.
Garden City Sand Co., Chicago, Ill.
Webster Foundry Sand Co., Philadelphia, Pa.

MULTIPLE DRILLS—
Bickford Drill and Tool Co., Cincinnati, O.
Cleveland Punch & Shear Wks. Co., Cleveland, O

NICKEL PLATING OUTFITS—
Northampton Emery Wheel Co., Chicago, Ill.

NUTS (Self Locking)—
National Elastic Nut Co., Milwaukee, Wis.

NUTS AND BOLTS—
Upson Nut Co., Cleveland, O.
National Elastic Nut Co., Milwaukee, Wis.
Milton Manufacturing Co., Milton, Pa.

OILLESS BEARINGS—
C. H. Besly & Co., Chicago, Ill.

OIL BURNERS—
Rockwell Engineering Co., New York City.

OIL CUPS—
C. H. Besly & Co., Chicago, Ill.
James Bonar & Co., Pittsburg, Pa

OIL FILTERS—
James Bonar & Co., Pittsburg, Pa.

OIL PUMPS—
C. H. Besly & Co., Chicago, Ill.
Stilwell-Bierce & Smith-Vaile Co., Dayton, O.

OIL STORAGE TANKS—
Wm. B. Pollock Co., Youngstown, O.

OIL SEPARATORS—
Harrison Safety Boiler Works, Philadelphia, Pa.

OIL TANKS AND CARS—
Wm. B. Pollock Co., Youngstown, O.

ORE CARS—
The Pressed Steel Car Co. Pittsburg, Pa.

ORE CRUSHERS—
The Edward P. Allis Co., Milwaukee, Wis.
Jeffrey Mfg. Co., Columbus, O.
The Aultman Co., Canton, O.
Fraser & Chalmers Chicago, Ill.

ORE HANDLING MACHINERY—
A. Leschen & Sons Rope Co., St. Louis, Mo.

ORE SCREENS—
Rob't Aitchison Per. Metal Co., Chicago, Ill.
The Aultman Co., Canton, O.
Fraser & Chalmers, Chicago, Ill.
James Bonar & Co., Pittsburg, Pa.
Hendrick Mfg. Co., Carbondale, Pa.
Western Machinery & Supply Co., Chicago, Ill.

ORE TESTING MACHINERY—
Keystone Driller Co., Beaver Falls, Pa

PACKING—
C. H. Besly & Co., Chicago, Ill.
Jenkins Bros., New York City.
James B. Clow & Sons, Chicago, Ill.
A. Leschen & Sons Rope Co., St. Louis, Mo.

PAINT—
Iron Clad Paint Co., Cleveland, O.
Jos. Dixon Crucible Co., Jersey City, N. J.
The Ironsides Co., Columbus, O.

PATENT ATTORNEYS—
Wm. N. Cromwell, Washington, D. C.

PATTERN WORKS—
Gobeille Pattern Co., Cleveland. O.
Forsythe Pattern Works, Youngstown, O.
C. Birnbaum, Cleveland, O.
Buffalo Gear and Pattern Works, Buffalo, N. Y
Balkwill Pattern Works, Cleveland, O.

PERFORATED METALS—
Aitchison Perforated Metal Co., Chicago, Ill.
Fraser & Chalmers, Chicago, Ill.
Hendrick Mfg. Co., Carbondale, Pa.
Western Machinery & Supply Co., Chicago, Ill.

PIG IRON—
Cabeen Co., Philadelphia, Pa.
Rogers, Brown & Co., Cincinnati, O.
Reed F. Blair & Co., Pittsburg, Pa.
Clinton Iron & Steel Co., Pittsburg.
Bourne-Fuller Co. Cleveland, O.
M. A. Hanna & Co., Cleveland, O.
Pickands, Brown & Co., Chicago, Ill
F. B. Stevens, Detroit, Mich.
McKeefrey & Co., Leetonia, O.
Superior Charcoal Iron Co., Grand Rapids, Mich
Spearman Iron Co., Sharpsville, Pa.
Hickman, Williams & Co., Chicago, Ill,
Pickands, Mather & Co., Cleveland, O.
Republic Iron & Steel Co., Chicago, Ill.
American Steel Hoop Co., Pittsburg, Pa.
American Steel & Wire Co., Chicago, Ill,
J. H. Hillman & Son, Pittsburg, Pa.
C. R. Baird & Co., Philadelphia, Pa.
Pilling & Crane, Philadelphia, Pa.
Sloss Sheffield Steel & Iron Co., Birmingham, Ala
Cherry Valley Iron Co., Pittsburg, Pa.
Jerome Keeley & Co., Philadelphia, Pa.
Alabama Consolidated Coal & Iron Co., Birmingham, A'a.
American Steel & Wire Co., Chicago, Ill.
Tennessee Coal, Iron & Railroad Co, Birmingham, Ala.

PIPE (CAST IRON)—
James B. Clow & Sons, Chicago, Ill.
Massillon Iron & Steel Co., Chicago, Ill.

PIPE (RIVETED STEEL)—
Wm. B. Scaife & Sons, Pittsburg, Pa
Wm. B. Pollock Co., Youngstown, O.

PIPE COVERING—
C. H. Besly & Co., Chicago, Ill.
Jenkins Bros., New York City.

PIPE CUTTING AND THREADING MACHINES—
The Armstrong Mfg. Co., Bridgeport, Conn.

PISTON RODS—
Bethlehem Steel Co., So. Bethlehem, Pa.

PLANERS—
U. Baird Machinery Co., Pittsburg, Pa.
Bickford Drill & Tool Co. Cincinnati, O.
Danielson Machine & Tool Co., Cleveland, O
Atlas Machine Co., Pittsburg, Pa.

PLANISHED IRON —
American Sheet Steel Co., New York City.

PLATES—
Enterprise Boiler Co., Youngstown, O.
Republic Iron & Steel Co., Chcago, Ill.
Illinois Steel Co., Chicago, Ill.

PLUMBERS' AND GAS FITTERS' SUPPLIES—
C. H. Besly & Co., Chicago, Ill.
James B. Clow & Sons, Chicago, Ill.

PNEUMATIC APPLIANCES—
Clayton Air Compressor Works. New York.
W. J. Schaefer & Co., New York City.

PORTABLE FORGE—
C. H. Besly & Co., Chicago, Ill.
Vulcan Mfg. Co., Pittsburg, Pa.

POWER PRESSES—
Avery Stamping Co., Cleveland, O.
Bertsch & Co., Cambridge City, Ind.
Cleveland Punch & Shear Wks. Co., Cleveland, C.
E. Konigslow & Bro. Cleveland, O.
Danielson Machine & Tool Co., Cleveland, O.
Bethlehem F'dry & Mach. Co. S. Bethlehem, Pa.

POWER TRANSMISSON MACHINERY—
Jeffrey Mfg. Co., Columbus, O.
E. A. Delano, Chicago. Ill.
Dodge Mfg. Co., Mishawaka, Ind.
The Aultman Co., Canton, O.
I. & E. Greenwald Co., Cincinnati, O.
Link Belt Machinery Co., Chicago, Ill.
A. Leschen & Sons Rope Co., St. Louis, Mo.
Stillwell-Bierce & Smith-Vaile Co., Dayton, O.

PRESSES—
Bertsch & Co., Cambridge City, Ind.
C. H. Besly & Co., Chicago, Ill.
E. Konigslow & Bro. Cleveland, O.
Danielson Machine & Tool Co., Cleveland, O.
Avery Stamping Co., Cleveland, O.
Bethlehem F'dry & Mach. Co., S. Bethlehem, Pa.
Cleveland Punch & Shear Wks. Co., Cleveland, O.
Atlas Machine Co., Pittsburg, Pa.

PRESSURE GAUGES—
The Bristol Co., Waterbury, Conn.
James Bonar & Co., Pittsburg, Pa.

PULLEYS—
W. A. Jones Foundry Co., Chicago, Ill
E. A. Delano, Chicago, Ill.
Dodge Mfg. Co., Mishawaka, Ind.
The Aultman Co., Canton, O.
Jeffrey Mfg. Co., Columbus, O.
I. & E. Greenwald Co., Cincinnati, O.
Link Belt Machinery Co., Chicago, Ill.
A. Leschen & Sons Rope Co., St. Louis, Mo.
Stilwell-Bierce & Smith-Vaile Co., Dayton, O.

PUMPS (STEAM)—
The Edward P. Allis Co., Milwaukee, Wis
Blakeslee Mfg. Co., Du Quoin, Ill.
James Bonar & Co., Pittsburg, Pa.
Fred M. Prescott Steam Pump Co., Milwaukee Wis.
Hall Steam Pump Co., Pittsburg, Pa.
Southwark Foundry & Machine Co., Philadelphia, Pa.
Stilwell-Bierce & Smith-Vaile Co., Dayton, O.

PUNCHES—
E. Konigslow & Bro. Cleveland, O.

PYROMETERS—
Edward Brown, Philadelphia, Pa.
Vulcan Mfg. Co., Pittsburg, Pa.

RADIAL DRILLS—
Bickford Drill and Tool Co., Cincinnati, O.

RAILS—
Hyde Bros. & Co., Pittsburg, Pa.
American Steel Hoop Co., New York City.

RAILWAY SUPPLIES—
Cleveland City Forge & Iron Co., Cleveland, O.
Garden City Sand Co., Chicago, Ill.
Hyde Bros & Co., Pittsburg, Pa.

RELAYING RAILS—
Hyde Bros. & Co., Pittsburg, Pa.

RIVETS—
Champion Rivet Co., Cleveland, O.
Vulcanus Forging Co., Cleveland, O.

RIVETED STEEL PIPE—
The Wm. B. Pollock Co. Youngstown, O.

ROCK DRILLS—
Rand Drill Co., Chicago, Ill.
The Ingersoll-Sergeant Drill Co., New York.

ROLL FORGINGS—
Samuel Trethewey & Co., Pittsburg, Pa.
Frankford Steel & Forging Co., Philadelphia, Pa.

ROLLING MILL MACHINERY—
The United Boiler Co., Girard, O.
Totten & Hogg Iron and Steel Foundry Co., Pittsburg, Pa.
The Lloyd Booth Co., Youngstown, O.
West Penn Foundry & Machine Co., Avonmore, Pa.
Frank-Kneeland Machine Co., Pittsburg, Pa.
Turner, Vaughn & Taylor Co., Cuyahoga Falls, O
A. Garrison Foundry Co., Pittsburg, Pa.
Whiting Foundry Equipment Co., Harvey, Ill.

ROOFS—
Riter-Conley Mfg. Co., Pittsburg, Pa.
Wm. B. Scaife & Sons, Pittsburg, Pa.
McCullough Iron Co., Wilmington, Del.
American Bridge Co., New York City.

ROPE—
A. Leschen & Sons Rope Co., St. Louis, Mo.

ROPE AND CORDAGE—
Waterbury Rope Co., New York City.
Link Belt Machinery Co., Chicago, Ill.

SAFETY WATER COLUMNS—
James Bonar & Co., Pittsburg, Pa.

SAWS—
Peter Gerlach & Co., Cleveland, O.

SCRAP IRON—
Hyde Bros. & Co., Pittsburg, Pa.
Illinois Steel Co., Chicago, Ill.

SCREENS FOR COAL, ORE, ETC.—
Robt. Aitchison Perforated Metal Co., Chicago.
Hendrick Mfg. Co., Carbondale, Pa.
Jeffrey Mfg. Co., Columbus, O.
The Aultman Co., Canton, O.
Fraser & Chalmers, Chicago, Ill.
Western Machinery & Supply Co., Chicago, Ill.

SCREWS—
C. H. Besly & Co., Chicago, Ill.
Upson Nut Co., Cleveland, O.
Chicago Screw Co., Chicago, Ill

SCREW MACHINES—
American Tool Works Co., Cincinnati, O.

SECOND-HAND MACHINERY—
Hyde Bros & Co., Pittsburg, Pa.
George H. Bowler, Cleveland, O.
The Atlas Machine Co., Pittsburg, Pa.
The W. J. Carlin Co., Pittsburg, Pa.
C. C. Wormer Machinery Co., Detroit, Mich.
American Brokers & Traders Information Bureu, Pittsburg, Pa.
Carlin Machinery & Supply Co., Allegheny, Pa.
Pelton Engineering Co., Cleveland, O.
J. A. Burke, Chicago, Ill.

SEPARATORS—
Harrison Safety Boiler Works, Philadelphia, Pa.
James Bonar & Co., Pittsburg, Pa.

SHAFTING—
E. A. Delano, Chicago, Ill.
Dodge Mfg. Co., Mishawaka, Ind.
Pitts'mmons & Co., Cleveland, O.
The Aultman Co., Canton, O.
Atlantic Tube Co., Pittsburg, Pa.
Jeffrey Mfg. Co., Columbus, O.
I. & E. Greenwald Co., Cincinnati, O.
Bethlehem Steel Co., South Bethlehem, Pa.
American Steel & Wire Co., Chicago, Ill.
Link Belt Machinery Co., Chicago, Ill.
Stilwell-Bierce & Smith-Vaile Co., Dayton, O.
Atlas Machine Co., Pittsburg, Pa.

SHEARING AND PUNCHING MACHINERY—
Bertsch & Co., Cambridge City, Ind.
Danielson Machine & Tool Co., Cleveland, O.
Cleveland Punch & Shear Wks. Co., Cleveland, O.
Bethlehem F'dry & Mach. Co., S. Bethlehem, Pa.

SHAPERS—
Atlas Machine Co., Pittsburg, Pa.

SHEAR KNIVES—
Samuel Trethewey & Co., Pittsburg, Pa.

SHEET IRON AND STEEL—
Republic Iron & Steel Co., Chicago, Ill.
American Sheet Steel Co., New York City.
McCullough Iron Co., Wilmington, Del.
American Steel & Wire Co., Chicago, Ill.

SHIP YARDS—
Wm. Cramp & Sons, Philadelphia, Pa.

SOLID STEEL SHEAR KNIVES—
Samuel Trethewey & Co., Pittsburg, Pa.

SPECIAL MACHINERY—
Cleveland Punch & Shear Wks. Co., Cleveland, O.
James Bonar & Co., Pittsburg, Pa.
Avery Stamping Co., Cleveland, O.
The Aultman Co., Canton, O.
Jeffrey Mfg. Co., Columbus, O.
E. Konigslow & Bro. Cleveland, O.
Wheeling Mold & Foundry Co., Wheeling, W. Va.
Danielson Machine & Tool Co., Cleveland, O
Enterprise Mfg. Co., Columbiana, O.

STACKS—
Wm. B. Scaife & Sons, Pittsburg, Pa.

STAND PIPES—
The Wm. B. Pollock Co., Youngstown, O.
The United Boiler Co., Girard, O.

STEAM BOILER INSPECTORS—
Hartford Steam Boiler Inspection & Insurance Co., Hartford, Conn.

STEAM PIPE AND BOILER COVERING—
C. H. Besly & Co., Chicago Ill.

STEAM PACKING—
James B. Clow & Sons, Chicago, Ill.
C. H. Besly & Co., Chicago, Ill.

STEAM PUMPS—
Hall Steam Pump Co., Pittsburg, Pa.
Blakeslee Mfg. Co., Du Quoin, Ill.
Fred. M. Prescott Steam Pump Co., Milwaukee, Wis.
Edw. P. Allis Co., Milwaukee, Wis.
Southwark Foundry and Machine Co., Philadelphia, Pa.
James Bonar & Co., Pittsburg, Pa.
Stilwell-Bierce & Smith-Vaile Co., Dayton, O

STEAM SEPARATORS—
James Bonar & Co., Pittsburg, Pa.
Harrison Safety Boiler Works, Philadelphia, Pa
Wright Manufacturing Co., Cleveland, O.

STEAM SHOVELS AND DREDGES—
Marion Steam Shovel Co., Marion, O.
The Bucyrus Co., South Milwaukee, Wis.
The Thew Automatic Shovel Co., Lorain, O.

STEAM SPECIALTIES—
C. H. Besly & Co., Chicago, Ill.
James Bonar & Co., Pittsburg, Pa.

STEEL—
Otis Steel Co., Cleveland, O.
Cabeen Co., Philadelphia, Pa.
Champion Iron & Steel Co., Muskegon, Mich.
Crescent Steel Co., Pittsburg, Pa.
La Belle Steel Co., Pittsburg, Pa.
The Morris & Bailey Steel Co., Pittsburg, Pa.
Byron H. White, Chicago, Ill.
Monongahela Iron & Steel Co., Pittsburg, Pa.
American Steel Hoop Co., Pittsburg, Pa.
American Steel & Wire Co., Chicago, Ill.
C. R. Baird & Co., Philadelphia, Pa.
Tennessee Coal, Iron & Railroad Co., Birmingham, Ala.

STEEL BANDS—
American Steel Hoop Co., Pittsburg, Pa.
American Steel & Wire Co Chicago, Ill.

STEEL BLOOMS AND BILLETS—
American Steel & Wire Co., Chicago, Ill.
Cabeen Co., Philadelphia, Pa.
Champion Iron & Steel Co., Muskegon, Mich.
National Steel Co., Chicago. Ill.
Bethlehem Steel Co., South Bethlehem, Pa.
The Lorain Steel Co., Lorain, O.
American Steel Hoop Co., Pittsburg, Pa.
C. R. Baird & Co., Philadelphia, Pa.
Jerome Keeley & Co., Philadelphia, Pa.
Tennessee Coal, Iron & Railroad Co., Birmingham, Ala.

STEEL CARS—
The Pressed Steel Car Co., Pittsburg, Pa.

STEEL CASTINGS—
Otis Steel Co., Cleveland, O.
Bethlehem Steel Co., South Bethlehem, Pa.
Acme Steel & Malleable Iron Works, Buffalo N. Y.

STEEL CEILINGS—
Berger Manufacturing Co., Canton O.

STEEL FRAME MILL BUILDINGS—
Wm. B. Scaife & Sons, Pittsburg, Pa.
American Bridge Co., New York City.

STEEL HOOPS—
American Steel Hoop Co., Pittsburg, Pa.
STEEL PLANTS—
The Wm. B. Pollock Co., Youngstown, O.
The Riter-Conley Co., Pittsburg, Pa.
STEEL SHEETS—
Republic Iron & Steel Co., Chicago, Ill.
American Sheet Steel Co., New York City.
McCullough Iron Co., Wilmington, Del.
American Steel & Wire Co., Chicago, Ill.
STEEL TUBING—
Atlantic Tube Co., Buffalo, N. Y.
TANKS—
Enterprise Boiler Co., Youngstown, O.
Meehan Boiler & Construction Co., Lowellville, O
Wm. B. Scaife & Sons, Pittsburg, Pa.
The Wm. B. Pollock Co., Youngstown, O.
Riter-Conley Mfg. Co., Pittsburg, Pa.
The Aultman Co., Canton, O.
The United Boiler Co., Girard, O.
TANK CARS—
The Wm. B. Pollock Co., Youngstown, O.
TESTING MACHINERY—
Keystone Driller Co., Beaver Falls, Pa.
TIN AND TERNE PLATES—
American Tin Plate Company, New York City.
Champion Iron & Steel Co., Muskegon, Mich.
TIN PLATE MACHINERY—
Totten & Hogg Iron and Steel Foundry Co., Pittsburg, Pa.
West Penn Foundry & Machine Co., Avonmore, Pa
Lloyd Booth Co., Youngstown, O.
TOOL STEEL—
C. H. Besly & Co., Chicago, Ill.
Crescent Steel Co., Pittsburg, Pa.
La Belle Steel Co., Pittsburg, Pa.
Monongahela Iron & Steel Co., Pittsburg, Pa.
American Steel & Wire Co., Chicago, Ill.
TRAMWAYS—
A. Leschen & Sons Rope Co., St. Louis, Mo.
TRANSMISSION MACHINERY—
Link-Belt Machinery Co., Chicago, Ill.
W. A. Jones Foundry & Machine Co., Chicago.
Jeffrey Mfg. Co., Columbus, O.
Dodge Mfg. Co., Mishawaka, Ind.
The Aultman Co., Canton, O.
Brown Hoisting and Conveying Machine Co., Cleveland, Ohio.
TRANSMISSION ROPE (WIRE)—
American Steel & Wire Co., Chicago, Ill.
TROLLEY TRACKS—
Northern Engineering Works, Detroit, Mich.
Whiting Foundry Equipment Co., Harvey, Ill.
TROLLEY WIRES—
American Steel & Wire Co., Chicago, Ill.
TRUCKS—
Northern Engineering Works, Detroit, Mich.
TUBES—
National Tube Co., Pittsburg, Pa.
S. Fix' Sons, Cleveland, O.
Atlantic Tube Co., Pittsburg, Pa.
TUBE WELDING—
S. Fix Sons, Cleveland, O.
TUMBLERS—
Northern Engineering Works, Detroit, Mich.
Whiting Foundry Equipment Co., Harvey, Ill.
TURBINE WATER WHEELS—
Stilwell-Bierce & Smith Vaile Co., Dayton, O.
TURNBUCKLES—
Republic Iron & Steel Co., Chicago, Ill.
Cleveland City Forge & Iron Co., Cleveland, O.
TWIST DRILLS—
C. H. Besly & Co., Chicago, Ill.
TWIST DRILL CASES—
Vulcan Mfg. Co., Pittsburg, Pa.
VALVES—
James B. Clow & Sons, Chicago, Ill.
C. H. Besly & Co., Chicago, Ill.
Jenkins Bros., New York City.
James Bonar & Co., Pittsburg, Pa.
WASHERS—
Avery Stamping Co., Cleveland, O.
Milton Manufacturing Co., Milton, Pa.
WATER PIPE—
Massillon Iron & Steel Co., Chicago, Ill.
WATER SOFTENING PLANTS—
Wefugo Co., Cincinnati, O.
Pittsburg Filter Mfg. Co., Pittsburg, Pa.
WELDLESS TUBES—
Atlantic Tube Co., Pittsburg, Pa.
WIRE—
American Steel & Wire Co., Chicago, Ill.
Summit Wire Co., Cuyahoga Falls, O.
WIRE COATING—
The Ironsides Company, Columbus, O.
WIRE FENCING—
American Steel & Wire Co., Chicago, Ill.
WIRE FILLER—
The Ironsides Company, Columbus, O.
WIRE MACHINERY—
S. W. Goodyear, Waterbury, Conn.
Turner, Vaughn & Taylor Co., Cuyahoga Falls, O
WIRE NAILS—
American Steel & Wire Co., Chicago, Ill.
WIRE ROPE—
Waterbury Rope Co., New York City.
A. Leschen & Sons Rope Co., St. Louis, Mo.
American Steel & Wire Co., Chicago, Ill.
WIRE ROPE COATING—
The Ironsides Company, Columbus, O.
WIRE ROPE FILLING—
The Ironsides Company, Columbus, O.
WOOD PULLEYS—
Dodge Mfg. Co., Mishawaka, Ind.
WROUGHT PIPE—
National Tube Co., Pittsburg, Pa.

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The star (*) indicates that the adv. appears alternate weeks; the dagger (†) once a month; the double dagger (‡) once in three weeks; the parallel (‖) three times out of four.

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IRON AND STEEL MARKETS.

IRON ORE.

[On Lake Erie Docks.]

Special low-phosphorus hard ore, Bessemer	$5.50
No. 1 Specular, Bessemer	$5.75@ 6.00
No. 1 Bessemer hematite	5.25@ 5.75
Hematites No. 1 non-Bessemer	4.00@ 4.50
No. 1 Specular, non-Bessemer	4.50@ 4.75
Mesabi Bessemer	4.00@ 4.25

OLD RAILS AND SCRAP METAL.

[Delivered Cleveland.]	Gross Tons.
Old iron rails	$14.00
Old steel rails (6 ft. and over)	13.00
Old steel rails (6 ft. and under)	13.00
Old car wheels	17.00
	Net Tons.
No. 1 R. R. wrought scrap	$11.00
Mill scrap	8.00
No. 1 Machine cast scrap	11.00
Iron axles	17 00
Axle turnings	9.00
Wrought turnings (free from cast)	6.00
Cast borings	3.00
Uncut wrought iron boilers	4.50
Steel boiler plates	19.00
Grate bars	6 00
Pipes and flues (clean)	8.00
Tank Iron	8.00
Hoop and band iron	5.00
Sheet iron	5.00
Wrought drillings	6.00
Malleable iron	11.00
Stove plate	7.00

FOUR-NIGHT.

Cleveland Union Station.

Pennsylvania Lines

Foot of Bank Street.

Ticket Offices at Union Station, Euclid Av. and Woodland Av. Stations.
New City Ticket Office, No. 1 Euclid Av., Cor. Public Sq.
Through Trains run as follows by Central Time
*Daily. †Daily except Sunday.

From Cleveland to	Leave	Arrive
Pittsburgh and Bellaire	† 7:00 am	†11:15 am
Salem and Pittsburgh	* 8:00 am	* 8:30 pm
Salem and Pittsburgh	* 2:10 pm	*11:30 am
Philadelphia and New York	* 2:10 pm	*11:30 am
Baltimore and Washington	* 2:10 pm	*11:30 am
Pittsburgh, Bellaire and East	† 3:10 pm	† 6:25 pm
Baltimore and Washington	† 3:10 pm	† 6:25 pm
Ravenna and Alliance	* 5:15 pm	* 8:10 am
Philadelphia and New York	*11:10 pm	* 4:30 am
Baltimore and Washington	*11:10 pm	* 4:30 am
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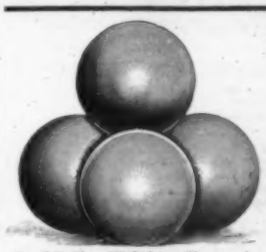

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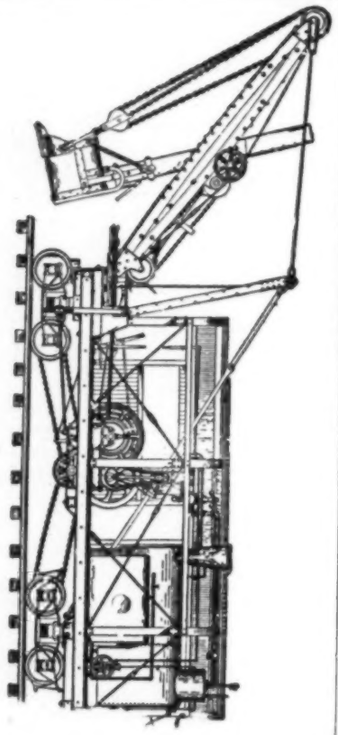

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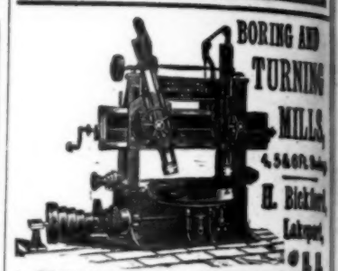

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